CHAPTER 3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Chapter 3 describes the existing condition of the resources, resource uses, and other features of the *Planning Area* and the *Decision Area*. The affected environment serves as the baseline of existing conditions. Changes to these existing conditions as a result of implementing proposed actions in Chapter 2 Alternatives are analyzed as impacts in Chapter 4.

This Chapter is organized into four sections. The first section describes special designations. The second section describes the resources in terms of existing conditions. The third section describes uses of resources in terms of both potential and existing uses and the last section describes existing social and economic conditions.

3.2 SPECIAL DESIGNATIONS

The BLM, through previous inventory and land planning efforts, has identified public land for special designation including Wilderness Study Areas (WSAs), Areas of Critical Environmental Concern (ACECs), Backcountry Byways, and National Historic Trails. These existing special designations are shown on Map 2-2, Special Designations - Alternative A. Special designations in the *Planning Area* include 10 WSAs, 13 ACECs, one Research Natural Area, and one National Natural Landmark. The WSAs and ACECs overlap in certain areas. The *Planning Area* also includes one Backcountry Byway.

3.2.1 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

ACECs are designated by the BLM where special management attention is needed to protect human life and safety from natural hazards or to protect and prevent irreparable damage to important historical, cultural, and scenic values; fish and wildlife resources; or other natural systems or processes (USDOI BLM 2003a). There are 13 existing ACECs located within the *Planning Area*, plus one Research Natural Area and one National Natural Landmark. All of these areas are located in Otero and Doña Ana Counties; none are located in Sierra County.

The acreage of each designation within the *Decision Area* is presented in Table 3-1 as is a summary of the resource values protected by the designation. Locations of the existing ACECs, the Research Natural Area, and National Natural Landmark are shown on Map 2-2.

3.2.2 HISTORIC TRAILS

Three historic trails pass through the *Planning Area*. One of these, El Camino Real de Tierra Adentro National Historic Trail is a Congressional designation under the National Trails System Act of 1968. The other two trails, the Mormon Battalion Trail located in Sierra County and the Butterfield Trail which passes through southern Otero County and Doña Ana County were used historically and are still evident in some places. These trails have potential to be National Historic Trails; however, neither one has yet been designated. The BLM continues to manage these trails under administrative designations and land use plans to protect their historic value. Approximate locations of these trails are shown on Map 2-2, Special Designations–Alternative A.

TABLE 3-1 ACECs, RESEARCH NATURAL AREA, AND NATIONAL NATURAL LANDMARK ON BLM-ADMINISTERED LAND			
SPECIAL DESIGNATION	**COUNTY**	**ACRES**	**RESOURCE VALUES PROTECTED**
Aden Lava Flow Research Natural Area	Doña Ana	3,746	Scenic and geologic
Alamo Mountain ACEC	Otero	2,528	Cultural, visual, and biological
Alkali Lakes ACEC	Otero	6,348	Biological and cultural
Cornudas Mountain ACEC	Otero	852	Scenic, biological, and cultural
Doña Ana Mountains ACEC	Doña Ana	1,427	Scenic, biological, and cultural
Los Tules ACEC	Doña Ana	24	Cultural
Organ/Franklin Mountains ACEC	Doña Ana	58,417	Scenic, special status species, and cultural
Rincon ACEC	Doña Ana	856	Cultural
Robledo Mountains ACEC	Doña Ana	7,077	Paleontological, cultural and scenic, and State endangered plant species
Sacramento Escarpment ACEC	Otero	4,474	Scenic and special status species
San Diego Mountain ACEC	Doña Ana	623	Research and cultural
Three Rivers Petroglyph ACEC	Otero	1,043	Cultural and scenic
Wind Mountain ACEC	Otero	2,308	Scenic, biological, and cultural
Kilbourne Hole National Natural Landmark	Doña Ana	5,500	

3.2.3 BACKCOUNTRY BYWAY

A BLM backcountry byway, a component of the National scenic byway system, focuses primarily on corridors along backcountry roads that have high scenic, historical, archaeological, or other public interest values (USDOI BLM 1993). The Lake Valley Backcountry Byway is the only one within the *Planning Area*. As the name implies, it is a narrow, albeit paved, winding backcountry highway extending approximately 43 miles total, 12 of which is across public land. Beginning about 18 miles south of Truth or Consequences at the junction of Interstate 25 and State Highway 152 in western Sierra County, the Byway extends west along State Highway 152 to Hillsboro, New Mexico. From Hillsboro, it follows State Highway 27 to Lake Valley and terminates at Nutt, New Mexico at the junction of State Highways 26 and 27 in northeast Luna County. The Lake Valley Backcountry Byway provides excellent opportunities for scenic views and for area recreation and tourism. The Black Range Mountains, Caballo Mountains, Cooke's Peak, and Las Uvas Mountains are visible from the route. Located in an area formerly used for mining and ranching purposes during a historical settlement period, the Byway is also of historical value and promotes tourism in the area.

3.2.4 WILDERNESS STUDY AREAS

Per the mandate of the Federal Land Policy and Management Act (FLPMA), the BLM conducted a wilderness inventory in the Las Cruces District in 1979 and 1980 to determine presence and location of areas with wilderness characteristics. Wilderness characteristics are defined as (1) roadless areas of at least 5,000 acres of public land or of a manageable size; (2) land that generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; and (3) areas that provide outstanding opportunities for solitude or primitive and unconfined types of recreation. The criteria used to identify these characteristics are based on BLM's 1978 *Wilderness Inventory and Study Procedures Handbook.*

As a result of that inventory, a number of WSAs were designated in the District. All or parts of ten of these WSAs are within the *TriCounty Decision Area*. During the 1980s, the BLM completed the wilderness study and analysis and prepared the *New Mexico Statewide Wilderness Study EIS* (USDOI BLM 1988a) and forwarded its recommendations to the Secretary of the Interior and subsequently to the President and to Congress. A more complete description of the majority of the WSAs in the Las Cruces

District and the evaluation of its wilderness values are contained in the *New Mexico Statewide Wilderness Study, Volume 3: Wilderness Analysis Reports* (USDOI BLM 1988). BLM's recommendations to Congress regarding which WSAs or portions of WSAs should be designated as wilderness are described in the *New Mexico Wilderness Study Report, Volume 1: WSA Recommendations* (USDOI BLM 1991a) and the *Statewide Summary* (USDOI BLM 1991b). The WSAs are listed in Table 3-2 and are shown on Map 2-2.

Two WSAs in the Organ Mountains - Organ Needles and Peña Blanca - were designated through the land-use planning process as WSAs in the 1993 Mimbres RMP, (in accordance with Section 202 of FLPMA).

Since November 1980, the WSAs have been managed under *the Interim Management Policy for Lands under Wilderness Review* (USDOI BLM 1995) and are now managed under the *Management of Wilderness Study Areas Manual* (USDOI BLM 2012), until Congress either designates them as wilderness or releases them from further wilderness review.

3.2.5 WILD AND SCENIC RIVERS

Currently, no wild and scenic rivers (WSR) or Congressionally designated study rivers exist within the *Planning Area*. In an effort to ensure that no potentially eligible rivers were inadvertently missed, the BLM initiated a WSR review of all BLM-administered public land along waterways within the *Decision Area*.

The review was done to determine if any of the public land meets WSR eligibility criteria and suitability factors, as identified in the Wild and Scenic Rivers Act of 1968, as amended. The Act defines a river as "*a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, kills, rills, and small lakes*."

Five river segments were found to be eligible for consideration of suitability for inclusion into the Wild and Scenic Rivers System (Table 3-3). The eligibility inventory criteria are: the river must be free flowing and, with its adjacent land area, possess one or more outstandingly remarkable value. Three rivers in the initial inventory, the Sacramento River, the Rio Grande, and Tierra Blanca were determined to not be free flowing and were dropped from further evaluation. The WSR Eligibility Evaluation and descriptions of the river segments are contained in Appendix P.

None of the five segments met the suitability factors. Tentatively, they have been recommended to be dropped from further consideration, pending public review through the RMP process. The factors that caused the review team to arrive at a non-suitable determination were: Factor 1- Characteristics that do not make the public land involved a worthy addition to the National Wild and Scenic Rivers System; and Factor 6- Ability of the BLM to manage and (or) protect the public land involved as part of the National Wild and Scenic Rivers System, or by other mechanism (existing and potential) to protect identified values other than by WSR designation. See *BLM Manual 6400* for a listing of all 7 factors.

TABLE 3-2 WILDERNESS STUDY AREAS			
WSA	**COUNTY**	**ACRES[1]**	**DESCRIPTION**
Aden Lava Flow	Doña Ana	25,287	The main feature of the area is the lava flow, which occurred over 10,000 years ago. Chihuahuan Desert grassland and shrub associations make up the majority of the plant cover. The rugged terrain has excluded much human use which helps maintain its naturalness.
Brokeoff Mountains	Otero	31,606	The topography is characterized by gently sloping to flat westward radiating alluvial fans and numerous rugged, rocky, and steep canyons. These canyons provide outstanding hiking, rock climbing, photography, and sightseeing opportunities.
Jornada del Muerto[2]	Sierra	4,319	The topography is characterized by grasslands with old lava flows and associated cinder cones. The area provides outstanding opportunities for solitude and hiking cross-country with no marked or maintained trails.
Organ Mountains	Doña Ana	7,283	The area contains extremely rugged terrain with steep-sided crevices, canyons, and spires; and several perennial springs. There are many opportunities for solitude and primitive and unconfined recreation including hiking, backpacking, horseback riding, and birding.
Organ Needles	Doña Ana	7,630	This area is characterized by canyons of angular block rocky outcrops and needle-like spires of almost barren rock cleft with narrow chasms and green oak trees. Large boulders are found at the base of the spires. Elevations range from 4,000 to 9,000 feet.
Peña Blanca	Doña Ana	4,470	The landscape is characterized by rugged terrain, such as steep-sided crevices, canyons, and spires. Vegetation includes mixed desert scrub, piñon-juniper woodlands, mixed mountain shrub, and ponderosa pine. Some historical mining sites, earthen dams, and fences are scattered throughout the proposed wilderness area but the area still remains primitive allowing for solitude and recreational opportunities as well as unique and outstanding scenery.
Robledo Mountains	Doña Ana	12,946	Elevation in this area ranges from 4,000 to over 6,000 feet. Elevation ranges coupled with varied geology provides for a diverse range of landscape forms and habitat types. Many areas are far away from significant human development and provide opportunities for solitude.
Sierra de las Uvas	Doña Ana	11,067	The landscape is typically rugged terrain with opportunities for primitive and unconfined recreational opportunities. Unique landforms in the area include craters, volcanoes, lava flows, prominent mountains, rolling creosote covered plains, and mesquite dunes.
West Potrillo Mountains/ Mount Riley[3]	Doña Ana	157,185	The West Potrillo area is characterized by a volcanic landscape with elevations up to 5,400 feet. Broad creosote-covered plains slope gently to the east and west and portions of the area are covered with extensive grasslands. Characteristics of the Mount Riley area include three steep, intrusive peaks clustered together. Grasses and desert shrubs comprise most of the vegetation with isolated junipers on the mountain slopes. There are many opportunities for primitive and unconfined recreation
TOTAL		**261,793**	

NOTES:
[1]Acres in this table were calculated using different technologies from what was used in the New Mexico Wilderness Study Report which may result in different values.
[2]Portion of the Jornada del Muerto WSA within the *Planning Area*. Most of the 31,147-acre area is in Socorro County and is managed by the BLM Socorro Field Office.
[3]Does not include approximately 10,300 acres of the WSA in Luna County.

TABLE 3-3 WILD AND SCENIC RIVER ELIGIBLE SEGMENTS			
RIVER SEGMENT NAME	**LOCATION/LEGAL DESCRIPTION**	**COUNTY**	**MILES ON BLM**
Cuchillo Negro Creek	T. 12 S., R. 7 W., Section 9	Sierra	0.52
Three Rivers	T. 11 S., R. 9 E., Section 21	Otero	0.57
Tularosa Creek	T. 13 S., R. 10 E., Section 32	Otero	1.4
Percha Creek	T. 16 S., R. 7 W., Section 14	Sierra	1.0
Palomas Creek	T. 13 S., R. 8 W., Section 19	Sierra	0.15

3.3 RESOURCES

3.3.1 LANDS WITH WILDERNESS CHARACTERISTICS

In accordance with Section 201 of FLPMA, the BLM is required to maintain a current inventory of land under its jurisdiction and identify within that inventory lands with wilderness characteristics that are outside of the areas designated as WSAs. Through land use planning, the BLM may manage lands newly found to have wilderness characteristics to affect, protect or preserve all wilderness characteristics within those lands.

Between 2002 and 2005, the Las Cruces District Office received citizen's proposals for wilderness designation along with maps, photos, and descriptions of areas totaling approximately 713,000 acres in Sierra, Otero and Doña Ana Counties. A BLM Las Cruces District Office interdisciplinary team evaluated the proposals and determined that two areas, Nutt Grasslands and Bar Canyon met the wilderness criteria.

The Nutt Grasslands located in southwestern Sierra County provides outstanding opportunity for naturalness, solitude, and primitive and unconfined recreation, within a 6,000-acre roadless landscape. A prominent landform feature in the area is Nutt Mountain, surrounded by Chihuahuan Desert terrain, grasslands, and drainages. Also, the Nutt Grasslands provide potential habitat for the aplomado falcon and the black-tailed prairie dog, both of which BLM considers special status species.

Bar Canyon is located adjacent to the Organ/Franklin Mountains ACEC and is contiguous to the Peña Blanca WSA in Doña Ana County. The Bar Canyon area is land that was acquired in the Soledad Canyon Land Exchange in 2001. Peña Blanca South (260 acres) was acquired in 1994 and Peña Blanca North (120 acres) was acquired in 1995. The Organ Mountains area has outstanding recreation opportunities, exceptional scenic values and a variety of other natural resource values. This area provides outstanding opportunities for naturalness, solitude and primitive and unconfined recreation. Although these areas are less than 5,000 acres, they are manageable as wilderness because they are contiguous to the Peña Blanca WSA.

3.3.2 AIR RESOURCES

Three indicators were used to quantify existing air quality in the *Planning Area*: (1) measured ambient concentrations of criteria air pollutants, (2) observed levels of visibility, and (3) presence of permitted and unpermitted air pollutant sources. In portions of the *Planning Area* and locations in the surrounding region, information regarding concentrations of ambient air pollutants and observed levels of visibility is available in the form of air quality monitoring data, air permit data, and visibility data.

3.3.2.1 Ambient Air Quality

Criteria air pollutants associated with National Ambient Air Quality Standards (NAAQS) include nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), particulate matter equal to or less than 10 microns in diameter (PM_{10}), particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$), and lead. The State of New Mexico has promulgated standards for ambient air that differ from the NAAQS. The New Mexico Ambient Air Quality Standards (NMAAQS) applicable within the *Planning Area* are summarized in Table 3-4 (US EPA 2011).

No air quality monitors are located within Sierra and Otero Counties; however, nine air quality monitoring stations are located within Doña Ana County. Doña Ana County borders El Paso, Texas and Ciudad Juarez, Mexico. Because of the proximity of these urban areas, southern Doña Ana County has historically had air quality problems, including particulate matter and ozone pollution. Monitored pollutant concentrations reported to the U.S. Environmental Protection Agency (EPA) are summarized in Table 3-5.

Anthony, New Mexico, which lies on the border of Texas and New Mexico in southern Doña Ana County is within a particulate matter 10 microns or less in size (PM_{10}) nonattainment area. This area was designated nonattainment for PM_{10} by the US EPA in 1991. In 1995, the EPA declared a 42 square-mile region in the southeast corner of the County on the border of Texas and Mexico as a marginal nonattainment area for the 1-hour ozone standard. The nonattainment area includes the City of Sunland Park, Santa Teresa, and La Union, New Mexico as well as adjacent public land to the west.

The New Mexico Environment Department has noted that in recent years, Doña Ana County has not met the Federal ambient air quality standards for PM_{10}. These high levels of PM_{10} are largely due to dust storms in the region. While much of the dust in the Doña Ana County area is generated by natural events such as high wind speeds and dry soil conditions, man-made dust sources have increased as the County becomes more populated and development increases. In December 2000, a Natural Events Action Plan (NEAP) for Doña Ana County was submitted to EPA for review. The NEAP requires control of man-made sources of wind-blown dust in the County. This Plan includes agreements between primary stakeholders (such the New Mexico Department of Transportation, Doña Ana County, and New Mexico State University) and the New Mexico Environment Department. Specific actions including dust ordinances on the city and county levels, educational outreach tools, documentation of exceedances, and tools to minimize the public's exposure to PM_{10} are part of the NEAP (www.nmenv.state.nm.us/aqb/control_strat/sip/dona_ana_county_new_mexico.html).

3.3.2.2 Emission Sources

Numerous air emission sources are located within the *Planning Area*, which include major, minor, mobile, and unpermitted sources, as described in this section. Very few of these sources are actually on land administered by the BLM. The greatest concentration of these sources is in and around Las Cruces, New Mexico.

Major Sources: A major source, for permitting purposes, is defined as a source or facility that has the potential to emit 100 tons or more per year of any single criteria pollutant, 10 tons per year of any single hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants. The predominant facility with a major source permit in Sierra County is a copper mine. However, this facility is not operating currently. Major sources in Otero County include a U.S. Air Force base and an aluminum foundry. Major sources located in Doña Ana County include power plants, space research and technology facilities, missile ranges, and natural-gas compressor stations.

TABLE 3-4 NEW MEXICO AMBIENT AIR QUALITY STANDARDS		
POLLUTANT	**PRIMARY STANDARDS**	**AVERAGING TIMES**
Carbon monoxide	8.7 ppm (9.67 mg/m^3)	8 hours
	13.1 ppm (15 mg/m^3)	1 hour
Nitrogen dioxide	0.05 ppm (94.34 $\mu g/m^3$)	Annually (arithmetic mean)
	0.10 ppm (188.7 $\mu g/m^3$)	24 hour
Total suspended particulate matter	60 $\mu g/m^3$	Annually (geometric mean)
	90 $\mu g/m^3$	30 days
	110 $\mu g/m^3$	7 days
	150 $\mu g/m^3$	24 hour
Hydrogen sulfide	0.010 ppm	1 hour (statewide)
	0.003 ppm	0.5 hour (within 5 miles of municipalities of more than 20,000)
Total reduced sulfur	0.003 ppm	0.5 hour
Sulfur dioxide	0.02 ppm	Annually (arithmetic mean)
	0.10 ppm	24 hours
	None	3 hours

SOURCE: New Mexico Environment Department, 2006.
NOTES:
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter ppm = parts per million

TABLE 3-5 CRITERIA POLLUTANT MONITORED CONCENTRATIONS IN DOÑA ANA COUNTY					
POLLUTANT	**DESIGN VALUE**	**AVERAGING TIME**	**OBSERVATION PERIOD**	**NAAQS**	**NMAAQS**
O_3	0.069 ppm	8-hour	2009-2011	0.075 ppm	
NO_2	8 ppb	Annual	2011	53 ppb	50 ppb
NO_2	42, 50 ppb[1]	1-hour	2009-2011	100 ppb	
PM_{10}	11 exceedances	24-hour	2011	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$	11.9 $\mu g/m^3$	Annual	2009-2011	15 $\mu g/m^3$	60 $\mu g/m^3$
$PM_{2.5}$	38 µg/m3	24-hour	2009-2011	35 µg/m3	

SOURCE: US Environmental Protection Agency **maximum values*
KEY: $\mu g/m^3$ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standard; NMAAQS = New Mexico Air Quality Standard; O_3 = ozone; NO_2 = nitrogen dioxide; ppb = parts per billion; ppm = parts per million;
PM_{10} = particulate matter with an aerodynamic diameter equal to or less than 10 microns; $PM_{2.5}$ = Particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
NOTE: [1] There are 2 monitors for the 1-hour NO_2 standard in Doña Ana County.

Minor Sources: A minor source, for air permitting purposes, is defined as a source or facility that has a potential to emit criteria air pollutants in amounts greater than the "*significance*" threshold, but less than a major source. The significance threshold provides an emission baseline for criteria pollutants that determines which facilities must obtain permits. Sources that have emissions below the threshold would not be required to obtain a permit unless there are other applicable Federal, State, or County regulations that apply to the equipment at their facility.

Minor sources include a variety of industrial and commercial operations, including rock product and construction material industries such as portable crushing and screening plants, hot-mix asphalt plants, and concrete-batch plants. Stationary industrial sources in this category include paint shops, dry cleaners, and a broad range of manufacturing facilities such as those for consumer goods.

Mobile Sources: Vehicles represent the largest single air pollutant source category in the *Planning Area*. Emissions from vehicles include hazardous air pollutants, NO_2, CO, and particulate matter, which may warrant consideration in any assessment of ambient air quality in the *Planning Area*. The EPA Mobile Source Emissions Characterization and Prevention section states that emissions from vehicles are highly variable due to several factors including the driver, vehicle type, the grade of the roadway, and the vehicle load. Consideration of mobile source emissions may be reasonably limited to the major traffic routes that run through the *Planning Area* such as Interstate 25, U.S. Highway 70, and U.S. Highway 54.

Unpermitted Sources: There are many small, stationary emission sources that are not required to have an operating permit. These types of sources individually do not produce levels of air pollution that would substantially affect regional air quality, but may have a significant impact cumulatively. An air quality assessment of the *Planning Area* should treat such sources on the basis of expected distribution of generic emission-source categories in and around the *Planning Area*. In addition to stationary sources, other unpermitted sources of air pollution include vehicular travel on paved and unpaved roads, open burning (including prescribed fire for woodland management), and agricultural operations.

3.3.2.3 Visibility Conditions

Defined by the Clean Air Act, Class I areas include National parks greater than 6,000 acres, wilderness areas and National memorial parks greater than 5,000 acres, and International parks. These areas must have been in existence at the time the Clean Air Act was passed by Congress in August 1977. A network of monitoring stations in or near Class I areas are operated by land management agencies under the Interagency Monitoring for Protected Visual Environments (IMPROVE) program. The network collects data to identify and evaluate patterns and trends in regional visibility and the pollutants which contribute to reductions in visibility. Data from IMPROVE monitors located in three of the four Class I areas near the *Planning Area* provide the standard visual range for each monitor, which is the maximum distance at which a person can identify a black object against the horizon (US EPA 1999). Standard visual ranges for each of the three monitors on their best (highest visibility), worst (lowest visibility), and intermediate (average visibility) days are provided in Table 3-6.

The Guadalupe Mountains National Park monitor, located outside the southeastern corner of the *Planning Area*, recorded the lowest standard visual ranges in each category. The two monitors that demonstrated the best standard visual ranges, the Gila Wilderness and White Mountain Wilderness, are outside the northwestern corner of the *Planning Area* and north of the *Planning Area*, respectively.

TABLE 3-6 STANDARD VISUAL RANGES FROM "*IMPROVE*" MONITORS NEAR THE PLANNING AREA			
	STANDARD VISUAL RANGE (KM)[1]		
MONITOR	AVERAGE OF BEST VISIBILITY DAYS	AVERAGE OF INTERMEDIATE VISIBILITY DAYS	AVERAGE OF WORST VISIBILITY DAYS
Gila Wilderness[2]	275	196	116
Guadalupe Mountains National Park[2]	219	138	79
White Mountain Wilderness[2]	262	174	105

SOURCE: Interagency Monitoring of Protected Visual Environments, 2011.
NOTES:
[1]Standard visual range represents the maximum distance at which one can identify a black object against the horizon.
[2]The averaging period was 2002 to 2010 for monitoring data.
IMPROVE = Interagency Monitoring of Protected Visual Environments; km = kilometers

3.3.2.4 Climate

The BLM land in the *Planning Area* is located at the northern edge of the Chihuahuan Desert. The climate is characterized by hot summers and mild to cool winters. Precipitation is generally less than 10 inches per year with much of that falling in the summer as a result of the Southwest monsoon. Tables 3-7, 3-8, and 3-9 summarize average monthly temperatures and precipitation for Las Cruces (Doña Ana County), Alamogordo (Otero County), and Truth or Consequences (Sierra County).

TABLE 3-7 CLIMATE NORMALS (1981-2010) LAS CRUCES												
LAS CRUCES	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Average Temperature (°F)	43.8	48.1	54.1	61.4	70.2	78.6	81.4	79.4	73.8	63.0	51.5	43.5
Avg. Max Temperature (°F)	58.6	63.5	70.1	77.8	86.8	94.8	94.9	92.1	87.7	78.6	67.3	57.8
Avg. Min Temperature (°F)	29.1	32.7	38.2	44.9	53.7	62.4	68.0	66.8	59.9	47.4	35.7	29.1
Avg. Precipitation (inches)	0.51	0.41	0.22	0.29	0.40	0.66	1.53	2.22	1.33	0.94	0.46	0.77

TABLE 3-8 CLIMATE NORMALS (1981-2010) ALAMOGORDO												
ALAMOGORDO	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Average Temperature (°F)	43.9	48.6	54.8	62.6	71.4	79.8	80.9	78.8	73.4	63.1	51.5	43.6
Avg. Max Temperature (°F)	56.1	61.2	68.1	76.7	85.7	93.7	93.4	90.9	85.9	76.2	64.8	55.8
Avg. Min Temperature (°F)	31.6	36.0	41.5	48.4	57.1	65.8	68.4	66.8	60.9	49.9	38.3	31.4
Avg. Precipitation (inches)	0.72	0.63	0.42	0.38	0.49	0.79	1.81	2.19	1.48	1.17	0.72	0.93

TABLE 3-9 CLIMATE NORMALS (1981-2010) TRUTH OR CONSEQUENCES												
TRUTH OR CONSEQUENCES	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Average Temperature (°F)	42.0	47.0	53.1	61.0	70.4	78.9	81.2	78.7	72.9	62.0	50.0	41.4
Avg. Max Temperature (°F)	56.7	62.5	69.0	77.5	86.6	95.4	95.4	92.3	87.4	77.1	65.3	55.5
Avg. Min Temperature (°F)	27.4	31.6	37.3	44.5	54.1	62.5	67.0	65.1	58.4	46.8	34.6	27.3
Avg. Precipitation (inches)	0.46	0.37	0.33	0.23	0.36	0.84	2.04	2.10	1.62	1.13	0.60	0.85

Climate Impacts and Greenhouse Gas Emissions: Greenhouse gases (GHG) are chemical compounds in the Earth's atmosphere that allow incoming short-wave solar radiation but absorb long-wave infrared radiation re-emitted from the Earth's surface, trapping heat. Although GHG levels have varied for millennia (along with corresponding variations in climate), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably (IPCC 2007, 2001). Most studies indicate that the Earth's climate has warmed over the past century due to increased emissions of GHGs and human activities affecting emissions to the atmosphere are likely an important contributing factor (U.S. Energy Information Administration 2009).

Computer-based modeling suggests that rising GHG concentrations generally produce an increase in the average temperature of the Earth, which may produce changes in sea levels, rainfall patterns, and intensity and frequency of extreme weather events. Collectively, these effects are referred to as "*climate change*." The Intergovernmental Panel on Climate Change (IPCC), in its Fourth Assessment Report, stated that warming of the Earth's climate system is unequivocal and that warming is very likely due to anthropogenic GHG concentrations (IPCC 2007).

The Earth's global mean surface temperature rose 1.3°F (0.74°C) from 1906 to 2005 (IPCC 2007). In 2007, the IPCC predicted that by the year 2100, global average surface temperatures will rise 2.0-11.5°F (1.1-6.4°C) above 1990 levels. Increasing concentrations of GHGs are likely to accelerate the rate of climate change in the future, and there is evidence of this happening already (IPCC 2007). However, uncertainties remain as to how climate change will affect different regions. Computer model predictions indicate increases in temperature will not be equally distributed but are likely to be accentuated at higher latitudes. Data collected by the Goddard Institute for Space Studies indicate that northern latitudes have exhibited temperature increases of nearly 2.1°F since 1900, with a nearly 1.8°F increase since 1970 (Goddard Institute for Space Studies 2007).

Recent warming in the Southwest has been "*among the most rapid in the nation*" (U.S. Global Change Research Program, 2009). Across the West, the increase in average temperature during the past 5 years has been 70 percent higher than in the world as a whole (Saunders 2008). In New Mexico, rapid warming has occurred year-round since the 1960s. Temperatures have increased approximately 2°F in the winter and 3°F in the summer. These increases are significantly greater than the annual global trend of 1°F over the 20th century (Gutzler 2007). Climate models' projections for the future of the western US consistently predict higher temperatures. Warming is predicted to be greatest at higher elevations and in winter and early spring (Gutzler 2005).

Greenhouse Gas Emission Sources: GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, and several trace gases. Some GHGs, such as CO_2, occur naturally and are emitted into the atmosphere through both natural processes and human activities, while others are created and emitted solely through human activities. The GHGs that enter the atmosphere due to human activities include CO_2 from the burning of fossil fuels, solid waste, and trees and wood products; CH_4 emitted during the production and transport of coal, natural gas, and oil, as well as by livestock, deforestation, and agricultural practices; N_2O from agricultural and industrial activities and the combustion of fossil fuels and solid waste; and fluorinated gases that result from a variety of industrial processes.

Total GHG emissions in the United States rose 10.5 percent from 1990 to 2010. The primary GHG emitted by human activities in the United States is CO_2. It totals approximately 83.6 percent of all GHG emissions, with the largest source being fossil fuel combustion. According to the EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2010*, total greenhouse gas emissions in 2010 were 6,821.8 teragrams. These GHG emissions are partly offset by carbon sequestration in forests, trees, urban areas, and agricultural soils, resulting in a net emission of 5,747.1 teragrams in 2010 (U.S. Environmental Protection Agency 2012).

Total GHG emissions in New Mexico rose 16.7 percent from 1990 to 2007. The largest sources of GHG emissions in the State are electricity production, the fossil fuel industry and transportation fuel use. GHG emissions in New Mexico grew by an estimated 3 percent annually from 1990-2000 and then remained essentially the same from 2000-2007, despite a 6.7 percent growth in the State's population during that time. New Mexico's total greenhouse gas emissions in 2007 were 76.2 million metric tons of CO_2 (New Mexico Environment Department 2010). One teragram is equal to 1 million metric tons.

Regional Climate Trends and Impacts: The average temperature in the Southwest has already increased approximately 1.5°F (0.83°C) above a baseline period of 1960-1990 and is projected to rise 4.0-10.0°F (2.2°C-5.6°C) by the end of the century (Justus 2007). It is not possible to predict with certainty the effects of climate change on local- or regional-scale ecosystems, but climate change is certain to affect natural and human systems within the *Planning Area* and is likely to have a large impact on BLM management strategies. The U.S. Government Accountability Office Report on Climate Change states:

> *Federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others:*
>
> - *Physical effects, such as droughts, floods, glacial melting, and sea level rise;*
> - *Biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and*
> - *Economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses* (Government Accountability Office 2007).

In the Chihuahuan Desert, the most likely effects of climate change include the following:

- Higher average temperatures, particularly at night;
- More episodes of extreme heat;
- Greater evaporative loss from water bodies;
- Less runoff and more soil drought;
- Reduced groundwater recharge;
- Earlier peak stream flows in rivers;
- More extreme weather events, such as torrential rains and severe droughts;
- Higher rates of soil erosion;
- Increased invasive plant species, particularly non-native annual grasses;
- Increased frequency and intensity of wildfires;
- Shifting habitats for wildlife, including the development of "novel" ecosystems in which species that have been geographically separate in the past begin to share habitat; and
- Worsening air pollution problems as increased temperatures and drought contribute to ozone and PM_{10} production.

The most important way climate change is likely to affect the *Planning Area* is by decreasing already scarce water resources. Tree ring records show that New Mexico has alternated between multi-decadal drought and wet spell events for hundreds of years (Gutzler 2007). January through July 2011 was the driest on record for New Mexico. The *TriCounty* area was in severe to extreme drought for the years 2011 and 2012 (National Oceanic and Atmospheric Administration 2012).

Historically, most rain in the *TriCounty* area falls during the summer monsoon and winter rainy seasons, while the spring and fall "*shoulder*" seasons may see no rain at all. The monsoon season, typically mid-July to mid-September, is defined by a shift in wind patterns that brings moisture up from the Gulf of California, the Gulf of Mexico, and the eastern Pacific. In the coming century, projections show an

increased probability of drought for the region with a northward shift in winter and spring storm tracks. This is consistent with observations from the past few decades. There is presently no scientific consensus on how the summer monsoon may be affected by climate change (U.S. Global Change Research Program 2009).

The effect that higher temperatures, both observed and projected, will have on the region's water supplies is much clearer. Snowpack currently supplies approximately 70 percent of all water in the West (Saunders 2008) and almost all the water to the rivers that flow into the *TriCounty* area. The timing and capacity of these supplies are dependent on overall precipitation and temperature, which determines when the snowpack melts. Recent years have seen snowmelt push the timing of peak stream flows in spring as much as a month earlier than normal, thereby reducing flows in the summer and fall, when demand typically peaks (Saunders 2008). Reduced stream flows in the summer will leave ecosystems more dependent on summertime rains. Further exacerbating this vulnerability is the increasing tendency of rain to fall during infrequent, large-scale events that drain quickly and cause flooding and soil erosion. Such changes to the hydrologic cycle of the Chihuahuan Desert could have massive impacts on the region's wildlife and vegetation.

Current conditions in the Chihuahuan Desert represent the extreme range for many plant species, and the combination of increasing temperatures and decreasing water availability is likely to shift the range of many plants and animals northward or even cause them to become extinct (Saunders 2008). Increasing CO_2 concentrations also lead to fertilization and growth of specific plant species. The "*novel*" ecosystems created by climate change-induced habitat shifts also could lead to significant management challenges as plants and animals that once were geographically distinct combine in new ways.

As climate change causes an increase in air temperatures in the *Planning Area*, pollutants such as ozone and particulate matter that are formed more readily in warm air are likely to increase and cause a decline in air quality. Southern Doña Ana County ozone levels are elevated, and there is currently a small portion of the County that is designated nonattainment for coarse particulate matter. As air quality decreases further due to changes in climate, there is a possibility that areas within the *TriCounty Planning Area* could be designated as nonattainment for these pollutants.

3.3.3 SOIL RESOURCES

The U.S. Department of Agriculture, Soil Conservation Service (now the Natural Resource Conservation Service [NRCS]) mapped soils in Sierra County (USDA NRCS 1984), in areas of Otero County (USDA NRCS and US Forest Service 1981) and Doña Ana County (USDA NRCS and US DOI BLM 1980). The soil resources of the *Planning Area* are categorized according to soil associations, or in the recent terminology of the NRCS surveys, general soil map units.

Soils in the *Planning Area* are primarily the product of soil forming factors including climate, parent material, biological activity, the nutrient and hydrologic cycles, and landscape or topography. The soil associations mapped by NRCS are most closely correlated to the various landforms of the *Planning Area*, and the following description is primarily developed from the soil survey references. The soils in Sierra, Otero, and Doña Ana Counties are derived from a variety of rock types, including granitic, volcanic, metamorphic, sedimentary formations and alluvium deposits. Young and poorly-developed soils are typically formed by alluvial and eolian depositional processes. There are three broad categories of soils within the counties: (1) very shallow to deep, well-drained gravelly to sandy loams with varying concentrations of rock fragments (gravel, cobbles) found on mesas, hills, mountains, ridges, slopes, and bajadas; (2) deep, well-drained mix of clay and silty loams found on fan terraces, gentle piedmont slopes, distal ends of bajadas, swales, and ephemeral lake-beds or playas; and (3) deep, poorly- to well-drained clay loams to loams, and very fine sands in the floodplains and draw bottoms.

Some areas within the *Planning Area* exhibit soil piping, gullying, and head-cutting. Even though these erosional features can occur in any soil type and a wide variety of landforms, these conditions typically occur in finer-grained soils and locations that receive heavy rainfall runoff as well as areas of past and present surface disturbance. Soils in swales and draw bottoms typically are clays or silty clays that have a high potential to shrink and swell, which can contribute to soil cracking and tunneling.

3.3.4 WATER AND WATERSHED RESOURCES

Located mostly in the Chihuahuan Desert, the *Planning Area* normally functions under conditions in which evaporation rates exceed rainfall in most years. The Rio Grande and Tularosa basins dominate the physical conditions and watershed and hydrologic systems in the *Planning Area*.

3.3.4.1 Groundwater

All water rights in New Mexico are acquired in accordance with the State's substantive and procedural law, except where Congress or the Executive Branch has created a Federal reservation with a reserved water right. The New Mexico Office of the State Engineer, as delineated by statute and judicial decision, has divided the State into declared groundwater basins to assess and adjudicate water resources (see Map 3-1). The *Planning Area* contains 12 groundwater basins.

Located in Sierra County are the Las Animas, Rio Grande, Hot Springs Artesian, northern edge of the Mimbres, eastern portion of the Gila San Francisco, and western side of the Tularosa Basins. Otero County is dominated by the Tularosa and Salt Basins in addition to much of the Hondo and Peñasco Basins. Given the high number of groundwater basins occurring in the *Planning Area*, this section will focus on the two primary basins, the Lower Rio Grande and Tularosa Basins. These Basins were chosen for analysis due to their size, available data, and are generally impacted by the highest percentage of the population in the three-county area.

Groundwater in the Lower Rio Grande Basin (Mesilla Bolson), which underlies public land on both the east and west mesas above the Mesilla Valley in Doña Ana County, is generally of good quality. Most of the groundwater problems in this Basin are typically confined to specific areas. In general, communities in this region depend heavily on groundwater for domestic sources. However, based on the most recent report from the New Mexico Environment Department (NMED), the Lower Rio Grande groundwater basin has declined in groundwater quality (2007). The Source Water Assessment by the NMED Drinking Water Bureau in a 2010 report for the City of Las Cruces determined that city drinking was primarily good quality. However, low levels of uranium and arsenic have been detected in some wells.

The *New Mexico Lower Rio Grande Regional Water Plan* (LRGWUA 2004) also reported several problems. Sulfate (S) and chloride (Cl) concentrations have exceeded the New Mexico Water Quality Control Commission criteria in wells near or at Las Cruces, Mesquite, La Mesa, Vado, Berino, and La Union. Nitrate concentrations exceeding the standard of 10 milligrams per liter were reported in wells near or at Mesquite and La Union. Septic tanks, dairies, feedlots, and irrigated croplands are all potential nitrate sources.

Dissolved solids (salts) are the primary concern in the Tularosa and Salt basins. Groundwater quality ranges from fresh to brine and is highly dependent upon geology, landform, and usage (pumping rates and quantities available). Locations with saline to brine water quality have limited potential for development of groundwater resources. The primary contaminants in these waters are sodium chloride (NaCl), sodium (Na), and S. Concentrations of these contaminants are typically controlled by the type of rock in the aquifer and often vary with depth. In addition, leaking underground storage tanks in Alamogordo and at Holloman Air Force Base, White Sands Missile Range, and Fort Bliss have been detected in the past.

However, there are no reported water-supply wells in the Tularosa and Salt basins that have been contaminated from the potential sources described above (SCMRCDC 2002).

Detrimental changes can occur to aquifers from prolonged pumping rates, diminished aquifer recharge rates, and possibly subsurface mining activities. Significant depletions of groundwater within an aquifer could decrease pore water pressures and increase void space allowing the weight of the overlying rock to compact the aquifer and potentially lead to subsidence. These effects are essentially irreversible and could decrease the aquifer's holding capacity or render the aquifer nonfunctional.

3.3.4.2 Surface Water

The Clean Water Act is the primary law in controlling water quality. It provides instream water quality standards and maximum permissible pollution discharge levels. In New Mexico, water quality authority is vested in the New Mexico Water Quality Control Commission and is administered primarily by the various units of NMED. Surface-water quality standards are established by NMED and approved by the EPA. Under Section 401 of the Clean Water Act, the State can deny certification of Federal permits based on anticipated water quality impacts.

Surface-water rights in New Mexico are based on the principles of beneficial use and first appropriation, meaning that water rights are ranked in priority according to first beneficial use, and all unappropriated water belongs to the State. BLM provides management for surface waters that are on BLM land. Although perennial surface waters are sparse in southern New Mexico, the *Planning Area* contains the Rio Grande, Percha Creek, Three Rivers, Cuchillo Negro Creek, and Tularosa Creek along with numerous ephemeral and intermittent streams and springs. The *Planning Area* includes approximately 75 miles of the Rio Grande, the Nation's third longest river. This River provides water for agricultural irrigation in the Hatch, Mesilla, and El Paso valleys, and a portion of the City of El Paso's drinking water. Surface waters are important in supporting vegetation and fish and wildlife and in increasing water quality and providing opportunities for recreation. Desert washes function primarily as areas of overland flow collection and recharge areas for the surrounding watershed, differing in this respect from streams in more humid climates.

The designation of watersheds has been standardized for the Department of the Interior. In using the U.S. Geological Survey (USGS) hydrologic unit system, BLM watershed planning generally occurs at the fourth-level hydrologic unit, or "*sub-basin*" level.

The towns of Carrizozo and Tularosa and the City of Alamogordo have historically relied on existing surface water flowing from the perennial streams of the Sacramento Mountains and Sierra Blanca. All three communities have had to look to groundwater for future water supplies. The USGS stream-gauging records for Tularosa Creek over the past 10 years indicate a 30 percent decline in discharge (USDOI Geological Survey 2005).

Surface-water quality is measured by the concentrations of contaminants that cause impairment of designated, existing, or past uses. Surface water is necessary on public land to maintain existing riparian vegetation, to provide water for fish and wildlife and livestock, to enable authorized recreational activities, and to recharge aquifers. If surface-water quality is degraded to the point that the water cannot be used, or degrades human or ecological health, then public land use is also impaired. Surface-water quality problems are detailed in New Mexico's 303(d) list of impaired waters, which designates all impaired waters as Category 5 watersheds. The 303(d) list of impaired surface waters are those that are defined as impaired by point sources and nonpoint sources of pollutants. Each watershed is given a Hydrologic Unit Code, which is an eight-digit code defined by the USGS. These codes, and the

associated names that identify various watersheds, are shown in Table 3-10 (NMED 2007). The Total Maximum Daily Load determines the amount of pollutants that a body of water can receive.

TABLE 3-10
WATERSHEDS WITH 303(d) LISTED WATERS IN THE *PLANNING AREA*

IMPAIRED WATERS	HYDROLOGIC UNIT CODE
Tularosa Valley	13050003
Rio Grande - Elephant Butte Reservoir	13020211
Rio Grande - Caballo	13030101
Rio Grande - Las Cruces – El Paso	13030102

The surface-water quality is generally good in the rural parts of the *Planning Area*, and the trend has been to improve the protection of bodies of water from point and nonpoint source pollution over the last 10 to 20 years, resulting in improved surface-water quality. However, surface-water quality in the expanding urban, commercial, and industrial areas of the Mesilla Valley shows a different trend. The expansion and complexity of these areas have increased stormwater runoff and nonpoint source pollutants and have decreased water infiltration to shallow groundwater aquifers. This trend, mixed with increased litter, pet wastes, and other urban pollutants, have caused higher concentrations of bacteria to be routed to rivers, such as the Rio Grande. This scenario may partially explain bacteriological pollutants (fecal coliform and *E. coli*) in excess of the Total Maximum Daily Load allowed for the lower Rio Grande from the Caballo Reservoir to the Texas-New Mexico border.

The surface-water body in the *Planning Area* that would be potentially most influenced by public land management is the Rio Grande. Its watershed constitutes nearly 50 percent of BLM land in the *Planning Area* and according to the New Mexico's 303(d) list of impaired waters is not meeting water quality standards with respect to fecal coliform. The probable listed sources of impairment includes livestock on public land, dairy and feedlot operations, runoff from impervious surfaces such as streets and parking lots, septic systems, and other sources. In the urban areas of Doña Ana County, it has been shown that a significant emergent source of fecal coliform is the transformation of undisturbed or rural land uses into developed urban or suburban land.

3.3.5 GEOLOGY

The geologic resources of the *Planning Area* are best understood within the context of the regional physiography, the mode of formation and spatial occurrence of the various rock types within the area, and the geologic structures and history that combined to produce the geologic conditions that exist in the area (see Map 3-2). The physiography, rock units, geologic structure and tectonic history of the *Planning Area* are discussed in this section. Rather than describing current conditions for each county, conditions are summarized for the entire *Planning Area*, with specific counties mentioned as applicable.

The most prominent geologic resources are located in the rugged and colorful mountain ranges found throughout the *Planning Area*. The unique or scenic geologic features in the many north-trending mountain ranges, including the San Andres, Organ, Caballo, and Mimbres Mountains, add value to the existing and proposed ACECs and WSAs that are managed for other resources.

3.3.5.1 Physiography

Portions of four major physiographic provinces are located within the boundaries of New Mexico: the Colorado Plateau, Basin and Range, Southern Rocky Mountains, and Great Plains. The *Planning Area* is primarily within the Basin and Range province, but includes a small portion of the Great Plains province

in northeast Otero County and a small portion of what is known as a Transition Zone in western Sierra County that has characteristics of both the Colorado Plateau and the Basin and Range provinces (Chamberlin and Cather 1994; Grant and Foster 1989).

The Basin and Range province contains the Rio Grande Rift, a dominant tectonic feature that has influenced the geomorphic features and geologic history of the *Planning Area*. Land within Sierra and Doña Ana Counties has been subjected to severe deformation by Cenozoic extensional tectonism associated with the Rio Grande Rift. The rift system was superimposed on a weakened crustal region of block faults and thrust faults that were active during Pennsylvanian-age tectonism. The Rift is characterized by deep, asymmetric north-trending horsts, grabens, and half-grabens superimposed on the older structure (Butler 1996). The deep Jornada del Muerto and Mesilla Basins are part of the extensional rift zone. Block-faulted, uplifted mountains are located on both sides of the Rio Grande Rift and expose Precambrian granite and metamorphic basement rocks near the eastern flank of the San Andres and Organ Mountains, the western edge of the Caballo Mountains, and the center of the Mimbres Mountains.

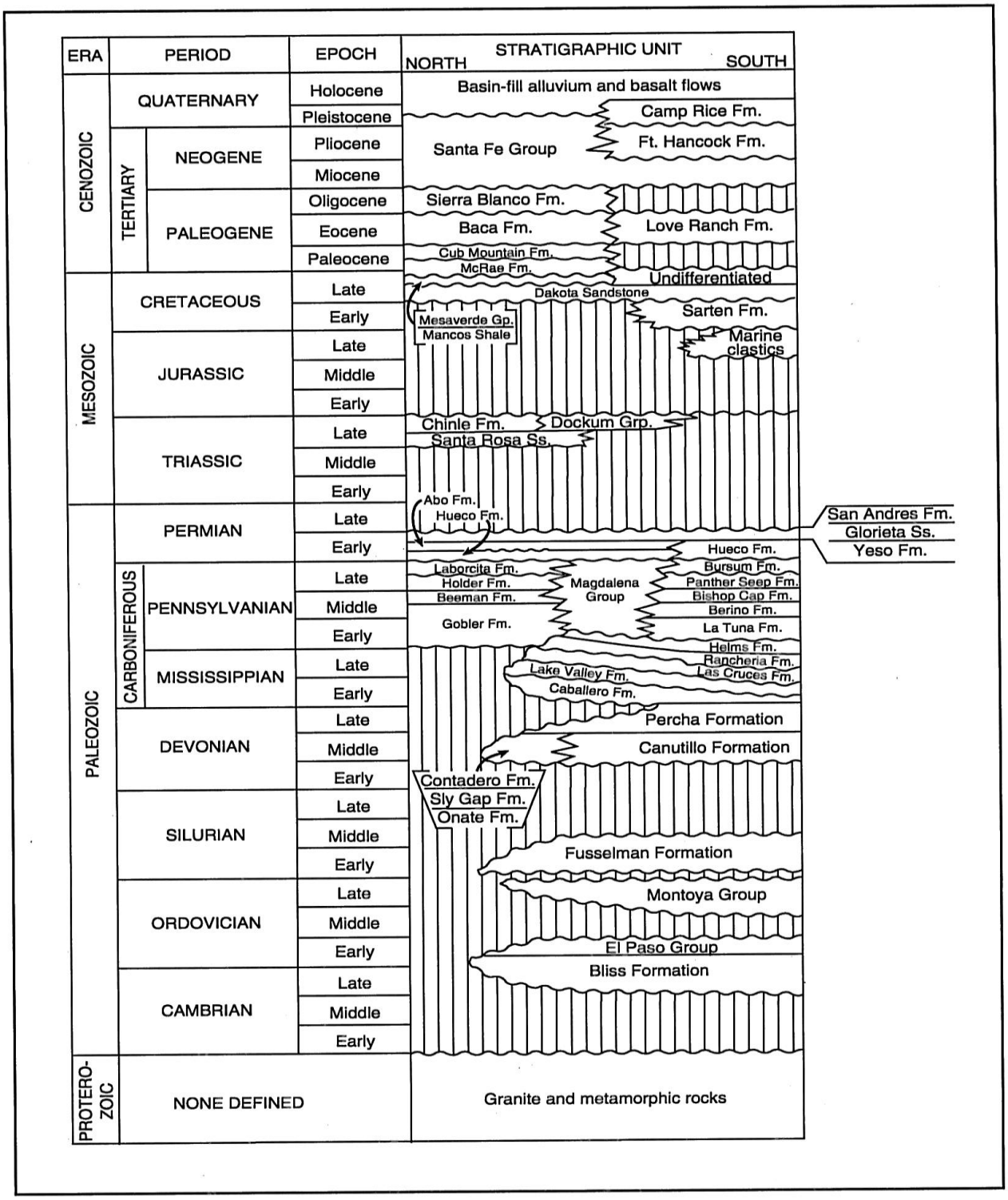
3.3.5.2 Rock Units

The lithology, areal extent, and thickness of the major rock types present in New Mexico are described by Grant and Foster (1989) in an introduction to their discussion of future petroleum provinces. A general stratigraphic chart for the south-central New Mexico region, prepared by Butler (1996), is presented on Figure 3- 1. It is useful to mention that the formation names for Figure 3-1 may not match those for Map 3-2 and corresponding legend because the USGS geologic map includes formation names for age-correlative formations in other areas of New Mexico. This report describes the rock types, areal extent, stratigraphic thicknesses, and general thickness trends for rock units in the *Planning Area*, beginning with the oldest known rocks.

Precambrian (Proterozoic): Precambrian rocks exposed in the *Planning Area* include granites, quartzites, gabbros, metasedimentary, and metavolcanics. In Sierra County, significant exposures of Precambrian rocks are found in the San Andres, San Mateo and Caballo Mountains, and lesser outcrops are found in the Sierra Cuchillo Mountains and Fra Cristobal and Black Ranges. In Doña Ana County, Precambrian rocks are found in the San Andres and Organ Mountains. The only Precambrian rocks exposed in Otero County are in Pajarito Mountain and near the town of Bent, New Mexico, both of which are in the far northeast corner. Some Precambrian rocks host metallic minerals and have been mined for gold, silver, and other minerals at several locations in the *Planning Area*.

Cambrian – Ordovician: Sedimentary rocks of Cambrian–Ordovician age exposed in the *Planning Area* include quartz sandstones, shales, limestones and dolomites. In Sierra County, significant exposures of Ordovician– Cambrian rocks are found in the San Andres, San Mateo and Caballo Mountains, and lesser outcrops are found in the Sierra Cuchillo Mountains and Fra Cristobal and Black Ranges. In Doña Ana County, Ordovician–Cambrian rocks are found in the San Andres and Organ Mountains. Ordovician rocks are exposed in the Sacramento Mountains in Otero County. Formations include quartz sandstones of the Upper Cambrian-Lower Ordovician Bliss Formation, and dolomites of the Lower Ordovician El Paso Formation and Middle Ordovician Montoya Group.

FIGURE 3-1 GENERAL STRATIGRAPHIC CHART



Silurian-Devonian: Sedimentary rocks of Silurian-Devonian age exposed in the *Planning Area* include shales, limestones, and dolomites. In Sierra County, significant exposures of Silurian and Devonian rocks are found in the San Andres, San Mateo and Caballo Mountains, and lesser outcrops are found in the Sierra Cuchillo Mountains and in the Fra Cristobal and Black Ranges. In Doña Ana County, Silurian and Devonian rocks are found in the San Andres and Organ Mountains. Ordovician rocks are exposed in the Sacramento Mountains in Otero County. Formations include the cherty dolomite of the Silurian Fusselman Formation, and black shale of the Late Devonian Percha Formation.

Mississippian: Sedimentary rocks of Mississippian age exposed in the *Planning Area* consist of dark, cherty limestone. In Sierra County, significant exposures of Mississippian-age rocks are found in the San Andres, San Mateo and Caballo Mountains, and lesser outcrops are found in the Sierra Cuchillo Mountains and Fra Cristobal and Black Ranges. In Doña Ana County, Mississippian-age rocks are found in the San Andres and Organ Mountains. Mississippian-age rocks are exposed in the Sacramento Mountains in Otero County. Lithologies include porous carbonate shelf facies of the Late Mississippian Lake Valley Formation.

Pennsylvanian: The abundance of isolated outcrops of Pennsylvanian strata in New Mexico that resulted from the complex geological history of the region has led to a confusion of multiple names and descriptions for Pennsylvanian sediments that are difficult to correlate. Grant and Foster (1989) observed that extensive tectonism during the Pennsylvanian orogeny "*resulted in the accumulation of a varied suite of rocks.*" The variation in Pennsylvanian-age rocks is evident in the long list of Pennsylvanian-formation names in New Mexico.

Sedimentary rocks of Pennsylvanian age are exposed in outcrops throughout Sierra and Doña Ana Counties and have been penetrated by the drill bit in much of the *Planning Area*. Isopach maps of the Pennsylvanian System show a sedimentary sequence in the Rio Grande Rift ranging from 1,000 to more than 3,000 feet thick. Compression toward the Rift caused thrust faulting and thickening of the Pennsylvanian section in deep basins of northern Doña Ana County and southern Sierra County. Uplift of the Otero Platform resulted in thinning and non-deposition of Pennsylvanian sediments in the eastern half of Otero County. Formations within the Magdalena Group include the Lower Pennsylvanian Lead Camp Limestone; and gray limestone, shaly limestone, and black shale of the Upper Pennsylvanian Panther Seep Formation. Pennsylvanian rocks are exposed in the San Andres, San Mateo, and Caballo Mountains, and lesser outcrops are found in the Sierra Cuchillo Mountains and Fra Cristobal and Black Ranges. In Doña Ana County, Pennsylvanian-age rocks are found in the San Andres and Organ Mountains. Pennsylvanian-age rocks are exposed in the Sacramento Mountains in Otero County.

Permian: Rocks of Permian age are present in mountain range outcrops throughout Sierra and Doña Ana Counties and are common throughout the western *Planning Area* in subsurface rocks penetrated by the drill bit during oil and gas exploration. An isopach map of the Permian System shows sediment thicknesses ranging from 1,000 feet in western Doña Ana County to more than 3,000 feet in northern Sierra County and western Otero County (Grant and Foster 1989). Relatively flat-lying Permian rocks outcrop extensively in eastern Otero County. Formations include the Lower Permian Abo Formation consisting of red bed sandstones, siltstones, and shale; limestones of the Lower Permian Hueco Formation; evaporates and sandstones of the Lower Permian Yeso Formation; sandstones of the Lower Permian Glorieta Formation; and Middle Permian San Andres Limestone.

Triassic: Minor outcrops of Triassic rocks occur in northern Otero County. Outcrops are recognized as the Upper Triassic Chinle Group and Moenkopi Formation.

Jurassic: Jurassic rocks are recognized in the deep Mesilla Basin in southern Doña Ana County. No outcrops have been mapped in the *Planning Area*. The rocks consist of Upper Jurassic marine sandstones and shales.

Cretaceous: Rocks of Cretaceous age are exposed east of the Caballo Mountains in central Sierra County along the slopes of the Sierra Blanca Range and Cornudas Mountains in Otero County, and in the East Potrillo Mountains in southern Doña Ana County. Although relatively thin in outcrops, the deposits near the Caballo Mountains thicken under the Jornada del Muerto Basin and attain subsurface thicknesses of up to 2,000 feet (Grant and Foster 1989). Cretaceous formations have been grouped into depositional packages associated with a series of transgressive-regressive marine shoreline features that include interbedded sand, shale, and coal sequences. Formations include the Upper Cretaceous Dakota Formation and Upper Cretaceous Mesaverde Group. The Mesaverde Group has been mined for coal in the Engle field east of Truth or Consequences and in the Sierra Blanca field northeast of Tularosa.

Tertiary: Tertiary-age rocks are present throughout the *Planning Area* and consist primarily of volcanic lava flows, ash-fall tuffs, and pyroclastic flows. The Sierra de las Uvas, Organ Mountains, Black Range, and Sierra Cuchillo Mountains are dominated by Tertiary volcanic rocks. Minor occurrences also are found in the southern Caballo Mountains, northern Sacramento Mountains, and northern San Andres Mountains. Because of their abundance, localized extent, and discontinuity, these rocks have local names too numerous to mention here.

Tertiary-Quaternary: Outcrops of Tertiary- and Quaternary-age sedimentary rocks are extensive throughout the *Planning Area*. An isopach map of the Quaternary-age sedimentary rocks reveals thick sequences of alluvial sediments in Cenozoic structural basins, such as the Tularosa, Rio Grande, Jornada del Muerto, and Palomas Basins. The Tertiary rocks in south-central New Mexico are a complex suite of sedimentary and volcanic rocks. In the Rio Grande Rift basins, the Tertiary System can be greater than 5,000 feet thick (Grant and Foster 1989). Formations include Tertiary intrusives and volcanics, the Miocene-Pliocene Popotosa Formation, and the Plio-Pleistocene Santa Fe Group.

Quaternary: Rocks of Quaternary age in the *Planning Area* are diverse, widespread, and have up to a few hundred feet thick. Quaternary deposits include alluvial and colluvial sands, silts, and gravels; piedmont slope and valley border fanglomerates grading from proximal boulder alluvium to distal sandsilt- clay mixtures; basin floor playa and lacustrine mudstones and siltstones; fine-grained eolian sand sheets and dunes; terrace, valley fill, floodplain, and channel sand, silt and clay deposits along major streams; angular cobble- and boulder-size talus deposits; and basalt flows. Quaternary deposits locally may intertongue with Plio-Pleistocene Santa Fe Group deposits. The surface accumulation and local abundance of these sediments make them convenient sources for construction aggregate.

3.3.5.3 Structural Geology and Tectonics

The location of the *Planning Area* at the intersection of the Basin and Range, Great Plains, and Transition Zone physiographic provinces has resulted in a complex structural regime (Butler 1996; Chamberlin and Cather 1994; Grant and Foster 1989). The structural geology is dominated by the Rio Grande Rift system.

The majority of the *Planning Area* is in the Basin and Range province and has been subjected to severe deformation by Tertiary-age extensional tectonism associated with the Rio Grande Rift. The rift system was superimposed on a weakened crustal region of block faults and thrust faults that were active during Pennsylvanian-age tectonism. The rift is characterized by deep, asymmetric north-trending horsts, grabens, and half-grabens superimposed on the older structure (Butler 1996). Deep north-trending basins that formed during Rio Grande rifting include the Tularosa-Hueco, Jornada del Muerto-Mesilla, and Palomas-Mimbres Basins. These basins are filled with thousands of feet of sedimentary rocks and

interbedded lava flows. The basins are separated by block-faulted, uplifted mountains located on both sides of the Rio Grande Rift that expose Precambrian granite and metamorphic basement rocks. The Sacramento, San Andres, Organ, and Caballo Mountains, and the Sierra Cuchillo and Sierra de las Uvas all are block-faulted horst mountains.

The western part of Sierra County is characterized by thick volcanic deposits of the Mogollon-Datil Volcanic Field, which is situated in the Transition Zone between the Basin and Range province and the Colorado Plateau province to the northwest. These Tertiary-age volcanic rocks were deposited during the opening of the Rio Grande Rift beginning about 30 million years ago. The thickness of the volcanic rocks has made investigation of underlying structures and rock types difficult, and not much is known of the deep subsurface.

The eastern part of the *Planning Area* in Otero County is part of the stable Great Plains province. The area is characterized by older buried structural features including Permian-age basins enclosed by a shallow marine shelf where carbonate reef, sandstone, and mudstone sediments predominate. North to northwest trending faults are present in the northeast and southeast corners of Otero County but do not have the large displacements of the Rio Grande Rift faults.

The historical record of earthquakes in the *Planning Area* from 1962 through 1998 lists only four earthquakes of magnitude 3.0 or greater (Sanford et al. 2002). Those earthquakes were located within the Rio Grande Rift system north and east of Las Cruces. Although New Mexico is in a seismically active area, the average earthquake intensity is a moderate 4.5 on the Richter scale. As such, a strong, damaging earthquake is not likely to occur in the *Planning Area*.

3.3.5.4 Geologic Value

Geologic resources may have an intrinsic aesthetic value that is often appreciated in scenic views or unique geomorphic features formed by geologic processes. Several locations within the *Planning Area* have received special designation to preserve natural geologic features having scenic value or unusual features that are valued by the public. These locations and a description of the geologic or scenic value responsible, at least in part, for the special designation are discussed in the section on Special Designations.

The trend for geologic resources is one of continued interest for scenic value or unique geologic interest, particularly in areas proposed for or having special designation. During the past 19 years, several areas of geologic or scenic interest have been included in areas given special designation by the BLM. There were eight ACECs (including two RNAs), seven WSAs, one trail, and one NNL listed as special designations within Doña Ana County in the 1993 Mimbres RMP. The Prehistoric Trackways National Monument was established by Congress in the Omnibus Public Land Management Act of 2009. A stand-alone management plan is being prepared for the Monument so it is not addressed in this RMP. The White Sands RMP designated one ACEC and the 1997 White Sands RMP Amendment designated five ACECs.

The Scoping Report for the *TriCounty* RMP/EIS lists 15 proposed ACECs or WSAs, of which 10 are mentioned as having scenic or geologic value. Although some of those proposed designations are additions or changes to existing designations, frequency of proposals indicates that BLM and the public continue to designate new land to protective status for geologic and scenic values.

3.3.6 VEGETATION

This section addresses vegetation communities (upland, woodland, riparian, and wetland) and noxious weeds and invasive species. The information used to characterize vegetation communities (or land cover types) within Sierra, Otero, and Doña Ana Counties was obtained from NRCS ecological site descriptions of Major Land Resource Areas (USDA NRCS 2005), and land cover information was derived from the Southwest Regional Gap Analysis Project (SWReGAP) data (USGS 2004). While the Major Land Resource Areas use a soil-based approach to identify and describe potential vegetative communities and habitat, the SWReGAP data emphasize the vegetative communities and provide greater detail when describing the plants associated with land cover categories.

Land cover in the *Decision Area* is grouped into five categories based on the dominant natural or semi natural vegetation in a location. Those categories are based on the satellite imagery of the SWReGAP, which maps dominant vegetation types on a regional scale (see Map 3-3) and Table 3-11 (Lowery et al. 2005). The New Mexico Department of Game and Fish (NMDGF) uses that land cover data set including riparian, wetland, and playa data to identify key habitats in its *Comprehensive Wildlife Conservation Strategy for New Mexico* (2006).

TABLE 3-11
LAND COVER IN DECISION AREA
ACRES AND PERCENT OF LAND COVER IN EACH COUNTY

LAND COVER TYPE	SIERRA	%	OTERO	%	DOÑA ANA	%	TOTAL	%
Forest-woodland	41,000	1.4	19,000	0.7	27,000	0.9	87,000	3.1
Grassland-herbaceous	290,000	10.3	460,000	16.2	253,000	8.9	1,003,000	35.4
Shrub-scrub	429,000	15.1	413,000	14.6	805,000	28.4	1,647,000	58.1
Barren	19,000	0.7	39,000	1.4	34,000	1.2	92,000	3.2
Developed and agricultural	1,100	>0.1	60	>0.1	2,000	>0.1	3,160	0.1
Unassigned[1]	20	>0.1	100	>0.1	100	>0.1	220	>0.1

NOTE: [1]Unassigned acres are acres within the *Planning Area* that were not included in any of the other categories.

3.3.6.1 Land Cover

Forest-Woodland: Woodland cover types consist of upland forests, woodlands, and savannas and are generally differentiated by aspect, by elevation, and by soil moisture, texture, and depth. They occupy approximately 87,000 acres within the *Planning Area* and have the largest elevational range of any cover type—from 3,800 feet to 12,000 feet.

Of the 87,000 acres of forest and woodland, 7,278 acres are classified under Fire Regime Condition Class (FRCC) 1; 57,909 acres are classified under FRCC 2; and 20,813 acres are classified under FRCC 3. Lands in the FRCC 1 category are close to historical conditions. Lands in FRCC 2 and 3 have potential for restoration. There is approximately 78,000 acres of forest-woodland restoration potential within the *Planning Area*. Due to environmental conditions such as drought and increased insect population dynamics, many forest and woodland areas in the southwestern United States and the *Planning Area* have declined in overall health. More than a century of fire suppression has led to excessive amounts of small diameter trees which degrades overall woodland health. Forest and woodland cover types are limited to places with adequate soil moisture. In the *Planning Area*, forests and woodlands are most often found at elevations above 5,000 feet, which are areas that receive a range of 15 to 20 inches of annual precipitation generally in the form of snowpack and seasonal rain. The understory can range from a dense mix of shrub and herbaceous layers to a sparse monoculture or to bare ground, depending on the site's characteristics and use. Within the *Planning Area*, forest-woodlands may be further differentiated into small stands of Ponderosa pine forest, piñon-juniper, pine-oak, and Madrean encinal.

Shrub-Scrub: Shrubland communities occur throughout the *Planning Area* and dominate most of the public land administered by the BLM. Shrub-scrub areas are normally found at elevations between 3,800 feet and 7,800 feet within the *Planning Area* and occupy 1,647,000 acres. These areas are usually drier than forests and woodlands and receive a range of 5 to 10 inches of annual precipitation, generally in the form of short, intense summer thunderstorms. Such areas are commonly associated with a less moist, more coarsely textured substrate (composed of materials such as limestone, basalt, or alluvium) that can range from shallow rocky alkaline to deep sandy loam. Some shrub-scrub and shrubland cover types are the results of degradation of the grassland herbaceous cover type. Shrub-scrub areas typically occur on dry flats and plains, alluvial fans, rolling hills, mesas, upper bajadas, rocky hillslopes, saddles, and ridges. They are normally open-canopy sites with herbaceous grass or forb understories. The density of the understory varies depending on the characteristics and use of the site.

Grassland-Herbaceous: Grassland-herbaceous land cover types are typically found at lower elevations (3,800 feet to 7,600 feet) and occupy 1,003,000 acres within the *Planning Area*. This cover type is usually associated with drier areas of the region such as low mountain slopes, gently sloping bajadas, rolling hills, plateaus, mesas, swales, playas, alluvial flats, and basins. Soils are generally, though not always, sedimentary and range from poorly infiltrating shallow clay pans to deep sites that are well drained and have a sandy or loamy texture. High variation in the amount and timing of precipitation affects the relative amount of cover of cool- and warm-season herbaceous species. These sites are typically dominated by grass with an open shrub or juniper layer. The density of grass on the site varies depending on the site characteristics and use. Chihuahuan Desert grasslands were formerly characterized by extensive areas of tobosa and black grama, with blue grama dominating at higher elevations. These tend to occur on the higher elevations where precipitation is higher and temperature is lower. Historically, these grasslands had few associated shrubs and currently reduced in range due to encroachment by woody species (Basurto, et al. 2006).

Barren: Barren and sparsely vegetated cover types—areas with generally less than 10 percent plant cover—are found from foothills to subalpine elevations. This cover type usually is found on steep cliff faces and their associated unstable scree and talus slopes, in narrow canyons, and on small rock outcrops composed of various igneous, sedimentary, and metamorphic bedrock. This cover type can also be found on lava flows and playa lake beds. Soil development and herbaceous cover is limited. This cover type occupies 92,000 acres within the *Planning Area*, typically appearing as scattered trees or shrubs, although some areas may exhibit small patches of dense vegetation.

Riparian, Wetlands and Playa Areas: Riparian and wetland areas are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (BLM Technical Reference 1737-15: *Riparian-Wetland Area Management*). Although riparian and wetland areas only occupy a small percentage of land in the *Decision Area*, they provide a wide range of functions that are important to fish and wildlife species and habitat, water quality, vegetation, soil conservation, and recreation. The *New Mexico Standards for Rangeland Health* contains ecologically based riparian standards that BLM must meet or are progressing toward. The ecological conditions of riparian and wetland areas are determined using proper functioning condition (PFC) assessments, which provide a consistent approach to evaluate the condition and function. Table 3-12 summarizes the PFC assessment in the *Decision Area*, and Appendix H provides information on the PFC assessment of each riparian or wetland area.

TABLE 3-12 DECISION AREA RIPARIAN CONDITION					
FUNCTIONAL STATUS	**TREND**	**MILES EVALUATED**	**PERCENTAGE OF MILES EVALUATED**	**ACRES EVALUATED**	**PERCENTAGE OF ACRES EVALUATED**
Nonfunctioning N=9	N/A	2.2	11	31.4	12
Functioning at risk	Downward N=10	2.9	15	30.1	11
	Upward N=11	1.8	9	11.8	5
	Not Apparent N=6	4.9	25	43.5	17
Proper functioning condition N=21	N/A	7.8	40	145.2	55
TOTAL		**19.6**	**100**	**262**	**100**
SOURCE: Bureau of Land Management Las Cruces District Office Riparian-Wetland Files, 2009.					

Playas are lower-elevation areas in closed drainage basins. Playas are dry for most of the time; however, shallow standing water may remain up to a few weeks following heavy rains. Playas contain a higher diversity of grasses and shrubs and a higher content of silt and clay soils than surrounding areas. Vegetation in playa areas varies depending on the amount salts and frequency of inundation. Vegetation varies from salt tolerant species such as salt grass (*Allenrolfea occidentalis*) and salicornia (*Salicornia rubra)* to saltbush (*Atriplex* spp.). Playas provide habitat diversity and increase water-holding capacity in the arid environment and are important for invertebrate species and consequently are important stopover points for feeding and resting for migrating birds, particularly waterfowl.

3.3.6.2 Vegetation Community Conditions

The natural range or "*limit of occurrence*," for a vegetation community varies depending on soils, climate, topography, aspect, slope, and elevation. According to BLM Technical Reference 4400-4, an ecological site is "*a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management*." A biotic community would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. For example, an ecological site's potential natural community may be described as 20 to 30 percent trees, 50 to 60 percent grasses, 10 to 20 percent shrubs, and 10 to 20 percent forbs.

Changes in climatic conditions, and disturbances such as fire and livestock grazing, can favor one species over another, altering the mix of species. When this happens to the extent that one vegetative community displaces all or part of another community, the displacement is called "*succession*." These changes are described in terms of ecological condition, which refers to the present state of the vegetation in relation to the potential natural community for that particular ecological site (USDOI BLM 2000).

In southern New Mexico, state-and-transition models are used to describe patterns and hypothetical causes of succession and persistent transitions in vegetation for particular ecological sites, as well as indicators of the mechanisms underlying those dynamics (Bestelmeyer et al. 2004). These models classify land condition (state) and describe the factors that might cause a shift to another state (a transition). As defined in New Mexico's *Rangeland Ecological Assessment,* areas categorized as being in

a "*reference state*" reflect conditions under natural disturbance regimes (e.g., prior to intensified settlement and land use in the late 1800s). Using ecological site data, state-and-transition models predict effects of multiple processes on ecosystem properties, including plant community composition and soil stability. The *Rangeland Ecological Assessment* uses the state-and-transition models to estimate condition and restoration opportunities across large areas. Table 3-13 lists the reference, non-reference, and unclassified acres in the *Planning Area* from the *Rangeland Ecological Assessment* data for each of the *Planning Area* land cover types. This regional assessment is designed to assist decision-makers in identifying key restoration opportunities by combining the expert opinion of professionals with soils, soil vegetation inventory method, and ecological site data.

TABLE 3-13
NEW MEXICO RANGELAND ECOLOGICAL ASSESSMENT STATUS FOR LAND COVER TYPES

LAND COVER TYPE	REFERENCE		NON-REFERENCE		UNCLASSIFIED[1]	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
Forest-woodland	39,000	8	9,000	0.7	37,000	4
Grassland-herbaceous	291,000	57	284,000	21	426,000	43
Shrub-scrub	167,000	33	997,000	74	485,000	49
Barren	7,200	1	52,000	4	33,000	3
Developed and agricultural	210	.04	1,700	0.1	1,200	0.1
Unassigned[2]	60	.001	480	0.004	90	0.009
TOTAL	504,470	100	1,344,180	100	982,290	100

NOTES:
[1] "*Unclassified*" refers to areas where experts did not agree or that were not evaluated.
[2] "*Unassigned*" acres are areas within the *Planning Area* that were not included in any of the other land cover type categories.

The *Rangeland Ecological Assessment'*s broad scale is appropriate for summarizing general information, such as estimates of total acres in different conditions, and as a general baseline to assess changes in vegetation community condition. *Rangeland Ecological Assessment* data are largely based on expert knowledge and have not been field validated or compared with satellite imagery, although these efforts are now under way as part of the second phase. Monitoring of rangeland conditions includes the regular collection of data to evaluate whether objectives or land health standards are being achieved and the effectiveness of management actions.

The Las Cruces District has been conducting vegetation restoration projects for 50 years or longer. Most restoration projects have been done using herbicides. While all projects are analyzed through an environmental assessment as required by NEPA, the overall program is governed by the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Land in 17 Western States Programmatic EIS (PEIS).* This document was released in 2007 and identifies 18 herbicide active ingredients for use on BLM land and analyzes the effects of using herbicides for treating vegetation on public land in the western U.S., including Alaska. The document also prescribes restrictions, standard operating procedures and mitigation measures for the use of herbicides. The PEIS does not make decisions regarding number of acres of treatment and defers to approved land use plans for this decision.

Consequently, the treatment project proponent is presented with a hierarchical form of guidance. Overall broad guidance regarding herbicides approved for use is contained in the PEIS; acres, areas, and vegetation types to be treated are contained in the local resource management plan; and specific herbicide, specific area and size, method of herbicide application and other details are contained in the project specific environmental assessment. Between 2005 and 2010, the District completed approximately 250,000 acres of grassland restoration projects (see Table 3-14).

TABLE 3-14 ANNUAL ACREAGE OF VEGETATION RESTORATION PROJECTS UNDER RESTORE NEW MEXICO IN THE *TRICOUNTY PLANNING AREA*, 2005-2010		
VEGETATION TARGET SPECIES	**YEAR**	**ACRES**
Creosote Bush	2006	2,280
Creosote Bush	2007	89,652
Creosote Bush	2008	28,702
Creosote Bush	2009	39,236
Creosote Bush	2010	10,157
TOTAL CREOSOTE BUSH		**170,027**
Mesquite	2007	2,443
Mesquite	2009	62,926
Mesquite	2010	13,438
TOTAL MESQUITE		**78,807**
Piñon/Juniper	2009	5,201
Piñon/Juniper	2010	407
TOTAL PIÑON-JUNIPER		**5,608**
Salt Cedar	2008	154
Tasajilla	2009	2,758
TOTAL ALL SPECIES		**257,354**

In 2005, the BLM in partnership with State and local organizations initiated a program entitled Restore New Mexico. Restore New Mexico partners include the following agencies and organizations:

- BLM
- Natural Resources Conservation Service
- New Mexico State Land Office
- Local Soil and Water Conservation Districts
- New Mexico Association of Conservation Districts
- Livestock grazing permittees
- New Mexico Department of Game and Fish
- New Mexico State University
- Agriculture Research Service
- New Mexico Department of Agriculture

Restore New Mexico is an aggressive partnership to restore New Mexico's grasslands, woodlands and riparian areas to a healthy and productive condition. Since its inception in 2005, Restore has become a model for rangeland conservation in the western United States. Table 3-15 lists acres with restoration opportunities and acres with limited restoration opportunities in Sierra, Otero, and Doña Ana counties in each land cover type. However, prior to implementing a project on-the-ground, further analysis and field validation would be completed. This could show that the numbers of acres within each category may change. Approximately 156,000 acres within the *Planning Area* been classified as having higher restoration potential and approximately 950,000 acres have been classified as having lesser potential for restoration to reference conditions. In addition, there are approximately 261,000 acres yet to be classified as to their potential for restoration. Once these acres are classified and as the classified acres are field evaluated, the above acreages would change.

TABLE 3-15 RESTORATION OPPORTUNITIES FOR LAND COVER TYPES									
	ACRES WITH RESTORATION OPPORTUNITIES BY COUNTY			ACRES WITH LIMITED RESTORATION OPPORTUNITIES BY COUNTY			UNCLASSIFIED ACRES		
LAND COVER TYPE	Sierra	Otero	Doña Ana	Sierra	Otero	Doña Ana	Sierra	Otero	Doña Ana
Forest-woodland	19,072	4,631	376	1,100	4,800	160	1,400	1,100	0
Grassland-herbaceous	8,300	22,000	20,000	93,000	23,000	42,000	12,000	52,000	12,000
Shrub-scrub	21,000	17,000	39,000	261,000	109,000	381,000	18,000	79,000	71,000
Barren	4,000	460	280	9,200	6,800	17,000	1,400	12,000	540
Developed and agricultural	0	10	150	260	30	770	0	15	90
Unassigned[1]	0	0	20	120	10	320	0	0	10
Total	52,372	43,831	59,826	364,680	143,640	441,250	32,800	144,115	83,640

According to the New Mexico's *Rangeland Ecological Assessment,* the term "*restoration opportunities*" means that, with some certainty, the area could return to a reference state. "*Limited restoration opportunities*," on the other hand, means that this is not economically or ecologically feasible. Further on-the-ground analysis and assessment would be needed to determine the feasibility of the project. Forest-woodland acreages were derived from NM Fire plan FRCC levels 2 and 3.
NOTE: [1] Unassigned acres within the *Planning Area* that were not mapped and need further review prior to placing them into one of the categories.

3.3.6.3 Noxious and Invasive Species

The establishment and spread of invasive species can directly affect vegetation by increasing competition with native species for water, nutrients and space. This limits the capacity of native communities to reestablish and to flourish. Over time, invasive species can alter the structure and function of the ecosystem, such as hydrologic function or fire return intervals (Barbour et al. 1999; West 1993).

Noxious weeds are non-native plants that have been designated "*noxious"* by State law because of their potential harm to the State economy, and are generally associated with agriculture and livestock husbandry. Under the New Mexico Noxious Weed Act of 1963, "*noxious weeds*" are identified as "*any species of plant, which is liable to be detrimental or destructive, and difficult to control or eradicate*." The Las Cruces District Office has identified 21 noxious weed species in 146 distinct populations in the *Planning Area* (see Table 3-16). Common locations for noxious weed infestations in the *TriCounty* region include roadsides and areas that are highly disturbed or degraded.

The Las Cruces District Weed Management Program focuses on inventorying existing infestations, preventing noxious-weed invasion, monitoring revegetation efforts for invasive weeds, and assessing the success of weed control efforts. Executive Order 13112 also requires Federal agencies to (1) identify actions that may affect invasive species; (2) use relevant programs to prevent introduction of invasive species; (3) detect, respond, and control such species; (4) monitor invasive species populations; (5) provide for restoration of native species; (6) conduct research on invasive species; and (7) promote public education. Additionally, goals and associated actions established in the *Partners Against Weeds-An Action Plan for the Bureau of Land Management* (USDOI BLM 1996) would be implemented.

TABLE 3-16 NOXIOUS WEEDS PRESENT (BY SPECIES) IN SIERRA, OTERO, AND DOÑA ANA COUNTIES				
NOXIOUS PLANT SPECIES		**NOXIOUS SPECIES PRESENT**		
COMMON NAME	**SCIENTIFIC NAME**	**SIERRA**	**OTERO**	**DOÑA ANA**
Russian knapweed	*Acroptilon repens*	X	X	X
Jointed goatgrass	*Aegilops cylindrica*		X	X
Camelthorn	*Alhagi maurorum*	X		X
Onionweed	*Asphodelus fistulosis*		X	X
Whitetop	*Cardaria draba*	X	X	X
Musk thistle	*Carduus nutans*		X	
Spotted knapweed	*Centaurea stoebe*		X	
Purple starthistle	*Centaurea calcitrapa*		X	
Malta starthistle	*Centaurea melitensis*	X	X	X
Canada thistle	*Cirsium arvense*		X	
Bull thistle	*Cirsium vulgare*		X	
Poison hemlock	*Conium malculatum*		X	
Field bindweed	*Convovulus arvensis*	X	X	X
Teasel	*Dispacus fullonum*		X	
Russian olive	*Elaeagnus angustifolia*	X	X	X
Leafy spurge	*Euphorbia esula*		X	
Perennial pepperweed	*Lepidium latifolium*	X		X
Eurasian watermilfoil	*Myrophyllum spicatum*	X		
African rue	*Peganum harmala*	X	X	X
Saltcedar	*Tamarix* spp.	X	X	X
Siberian elm	*Ulmus pumila*	X	X	X
SOURCES: New Mexico State University, 2005; Renz, 2005				

In compliance with Executive Order 13112 and BLM Manual 1745, and subject to future revisions to Bureau policy and guidance, where restoration, rehabilitation, or reclamation efforts (including Bureau authorized actions such as rights-of way) require reseeding activities, or use of other plant materials (such as potted plants, poles, etc.), non-native plant species would be used only if native species are not readily available in sufficient quantities. Care would be taken in selecting non-native species that are not likely to become invasive. If non-native plant species are used or identified for use in restoration, rehabilitation, or reclamation projects, the BLM, through the Bureau Plant Conservation Program and partner organizations, would work to identify and develop native replacements for the non-native species. Additionally, seed mixes used in these actions would use the closest locally adapted selections, varieties, or cultivars of native species available to improve success of the seeding effort.

3.3.6.4 Woodland and Plant Products

Forest and woodland types within the *Planning Area* occur primarily in Otero County and the higher elevations in Sierra and Doña Ana Counties. The majority of BLM's 87,000 acres of forest and woodlands in the *Decision Area* are piñon-juniper woodlands. Most of the piñon-juniper woodlands grow at intermediate elevations, where precipitation is insufficient for commercial timber species. Woodland resources are used for firewood and fence posts, and they also have value for watershed, wildlife habitat, recreation, and visual resources. Trees harvested for posts are generally found on the more productive piñon-juniper sites where the soils are deep and well-drained.

There has been demand for the collection and sale of live plants in the *Planning Area*. Generally, this limited demand has focused on collection of plants from vegetation sale areas; however, the vegetation sales areas have been depleted. Where a right-of-way or other type of land use authorization is granted by BLM, if the vegetation is to be cleared from a piece of land, any plants that may be useful for transplanting are made available for sale or "*adoption*" to the public.

Woodcutting for commercial and personal uses occurs within the *Planning Area* to a limited degree. Fuelwood is the main wood product produced from the woodlands in the *Decision Area*. The BLM charges $10 per cord for fuelwood for personal use. BLM formerly authorized the sale of vegetation in the *Planning Area*, including authorizing piñon nut harvest in certain areas. However, the sale areas have been pretty well exhausted and few plants are available. Since the existing forest and woodlands are managed for the enhancement and protection of the stands instead of the maximum production of wood products, no specific goals for allowable forest and woodland cutting have been established.

At this time forest, and particularly woodland, stands are considered to be classed in FRCC 2 and 3 Classes (based on deviations from pre-European settlement range of natural variation for community structure, fire frequency, and fire size). Changes that have occurred in these stands include live wildings as well as the following:

- Reduced tree growth
- Stagnated nutrient cycles
- Increased incidence of disease
- Insect and parasite infestations
- Decreased forage quality and quantity
- Increased fuel loading
- Increased vertical fuel continuity
- Increased canopy cover
- Increased severity of wildfires
- Decreased water availability and stream flow
- Fewer and smaller openings
- Shifts in habitat quality
- Lower aesthetic value

Forest and woodland stands within the BLM's *Decision Area* could continue to deteriorate without implementation of corrective management actions. Severe drought stress and insect infestation in piñon, in particular, has been occurring in the past few years.

3.3.7 WILDLIFE AND FISH HABITAT

This section describes the fish and wildlife habitat in the *Planning Area*. The data supporting the discussion of wildlife and fish habitat resources were obtained primarily from BLM and other Federal and State agencies. The BLM is responsible for managing fish and wildlife habitats while management of fish and wildlife species is overseen by State and Federal wildlife management agencies. Fish habitats include perennial and ephemeral streams, lakes, and reservoirs that support fish through at least a portion of the year. Wildlife species throughout this document have been grouped into categories of game species and nongame species to facilitate discussion.

3.3.7.1 Standard Habitat Sites

The Standard Habitat Site (SHS) system was designed by the BLM to assist in accumulating, storing, retrieving, and analyzing data on wildlife, vegetation, and other ecosystem determinants as they relate to wildlife resources. The BLM-based SHSs are used as indicators because they provide the best available data on current condition, trends, and forecasts of fish, wildlife, and habitat. However, SHS data are only available for the *Decision Area* (Map 3-4). For that reason, land cover types (derived from the SWReGAP) are used to supplement SHS data, particularly for those regions of the *Planning Area* not covered by SHS data. Land cover types are good indicators of wildlife habitat because they represent habitat requirements for a broad range of species. Furthermore, it is a more efficient use of agency resources to monitor changes in land covers and extrapolate these changes to a broad range of wildlife and fish species. Finally, the key habitats identified in the NMDGF *Comprehensive Wildlife Conservation Strategy for New Mexico*, which is based upon SWReGAP vegetation classifications (NMDGF 2006), is included out of a desire on the part of BLM to identify cooperative and collaborative approaches with the NMDGF to addressing important wildlife and habitat conservation needs.

SHS inventories of the Tri-County area were conducted in the late 1970s and early 1980s (USDOI BLM 1984a). Since the inventories were completed, large acreages of creosote-dominated types (Creosote Hill, Creosote Rolling Upland), Grass Rolling Upland and Mesquite Rolling Upland have been converted to grassland through vegetation restoration treatments. Since 1980, over 500,000 acres of grassland restoration has been completed (see Vegetation section). The acreages of SHSs shown in Table 3-17 represent what existed within the *Decision Area* at the time of the original inventories.

TABLE 3-17
STANDARD HABITAT SITE ACREAGES IN THE DECISION AREA

STANDARD HABITAT SITE	DOÑA ANA COUNTY	OTERO COUNTY	SIERRA COUNTY
Arroyo	6,921	62	33,738
Riparian	3,071	0	3,756
Creosote Breaks	102,905	0	65,332
Creosote Hill	41,394	5,785	17,484
Creosote Rolling Upland	348,482	383,390	499,026
Grass Flat	28,479	100,123	59,996
Grass Hills	3,319	24,877	4,514
Grass Mountain	66,709	111,158	45,271
Grass Rolling Uplands	35,313	188,929	78,902
Half-shrub Hill	0	0	137
Half-shrub Rolling Uplands	108,881	0	41,780
Malpais-Rock/Lava	23,300	0	4,616
Mesquite Rolling Uplands	51,984	9,179	24,705
Mesquite Sand Dunes	520,629	60,324	67,899
Mixed Shrub Hills	9,968	235,026	28,047
Mixed Shrub Mountain	38,937	31,488	27,781
Mixed Shrub Rolling Upland	9,851	113,269	32,732
Pinon-Juniper Grass Mountain	N/A	36,767	36,642
Salt Flat	0	28,905	0

Arroyo: This SHS is defined as drainages or arroyos with only brief intermittent water flow supporting vegetation not characteristic of surrounding uplands. Grass and forb species are often sparse. Typical shrub and tree species are desert willow, hackberry, Apache plume, western soapberry, littleleaf sumac, honey mesquite, ash, and bricklebush. Species diversity is high for birds, herptiles, and mammals. Arroyo habitats support most or all wildlife species found in surrounding habitats, plus additional species that are restricted to these habitats (riparian obligates) such as Southwestern willow flycatchers, yellow-billed cuckoos, and leopard frogs. Arroyo habitats are critical for breeding birds and mule deer.

Riparian: This SHS refers to areas along perennial streams and sometimes around permanent water sources. Dominant plant species vary but can include willows (*Salix* spp.), cottonwoods (*Populus spp.*), Arizona sycamore, boxelder, and ash. Understory cover consists of seepwillows, bricklebrush, and diverse grasses and forbs. Species diversity is high for birds, herptiles, and mammals (Degenhart et al. 1996; Findley et al. 1975). Typical wildlife species of riparian habitats include leopard frogs, checkered garter snakes, Chihuahuan whiptails, Bell's vireo, Southwestern willow flycatchers, western red bats, and raccoons. Most wildlife species of the *Planning Area* can be found in riparian habitats. Species diversity has not been identified for mammals. Key wildlife species have not been identified for this SHS. Riparian habitats support the highest diversity of wildlife species of any SHS.

Creosote Breaks: Vegetation in this SHS is dominated by creosotebush found on steep slopes and gravel ridges. This SHS experiences a high degree of soil erosion. Ecological condition and species diversity has not been identified for this SHS. Typical wildlife species of creosote breaks include Couch's spadefoots, western whiptails, side-blotched lizards, western diamondback rattlesnakes, cactus wrens, Merriam's kangaroo rats, and black-tailed jackrabbits. Because of proximity to the Rio Grande, this is an important habitat.

Creosote Hill: Vegetative composition is predominantly creosotebush which typically exists with a variety of subdominate species. These include bush muhly, burrograss, buffalo grass, broom snakeweed, tarbush, and littleleaf sumac. It is similar to the other creosotebush SHSs, but grama grasses are more prevalent and there is a higher diversity of shrub species, such as mariola, spicebush, whitethorn acacia, and fourwing saltbush. Bird species diversity for this SHS is low. Species diversity for herptiles and mammals has not been identified. Typical wildlife species of the creosote hills include red-spotted toads, western diamondback rattlesnakes, black-chinned sparrows, and black-tailed jackrabbits.

Creosote Rolling Upland: Vegetation in this SHS is dominated by creosotebush. Other subdominant species include bush muhly, burrograss, tobosa, desert holly, broom snakeweed, tarbush, and littleleaf sumac. Upland areas are drained by numerous arroyos and consist primarily of eroded soils and gravelly inclusions. Species diversity is moderate for herptiles, birds, and mammals. Creosote rolling uplands generally exhibit some of the lowest species diversities and densities of any SHS in the *Planning Area*. Typical wildlife species include side-blotched lizards, Big Bend patch-nosed snakes, black-chinned sparrows, and black-tailed jackrabbits.

Grass Flat: Grass flats typically occur in low swales and consist primarily of grass species, the dominant being tobosa grass. Other grasses include vine mesquite, gramas, muhlys, burrograss, dropseeds, and lovegrasses. Some areas are dominated by alkali sacaton. Shrub species are found in low numbers with soaptree yucca being most common along with broom snakeweed, honey mesquite, and althorn. Species diversity is moderate for herptiles, and low for birds and mammals. Grass flats in good condition can provide excellent wildlife habitat, particularly for ground-nesting and seed-eating birds. Grass flats often support playa lakes that are key breeding habitats for toads and spadefoots, and key wintering areas for shorebirds and waterfowl. Typical wildlife species include western box turtles, horned larks, meadowlarks, Ord's kangaroo rats, silky pocket mice, coachwhips, and pronghorn.

Grass Hill: Grama and tobosa grasses are the primary vegetation in this SHS. Forbs are seasonally abundant. Succulents are represented by ocotillo and yuccas. Shrub overstory is limited to Apache plume, skunkbush sumac, and broom snakeweed. Species diversity has not been identified for this SHS. Typical wildlife species of the grass hills include desert grassland whiptails, mountain patch-nosed snakes, scaled quail, canyon wrens, rock pocket mice, eastern cottontails, and mule deer.

Grass Mountain: This SHS occurs on slopes of mountain ranges above the surrounding uplands. It typically supports a high percentage of grama grasses with inclusions of tobosa grass, Kentucky bluegrass, June grass, and bluestems. Shrubby vegetation is widely scattered and represented by Datil yucca, Engelmann prickly pear, mountain mahogany, ocotillo, oaks, beargrass, Apache plume, rabbitbrush, and fringed sage. Species diversity is moderate for herptiles and mammals, and low for birds. Typical wildlife species of the grass mountain areas include eastern fence lizards, tree lizards, mountain patch-nosed snakes, scaled quail, Montezuma quail, and eastern cottontails.

Grass Rolling Upland: This SHS occurs in nonswale or isolated pocket settings with a lower density of grass species than the grass flat SHS. Grama grasses are common along with other grasses such as tobosa grass. Desert shrubs occur along with perennial forbs. Species diversity is moderate for herptiles, birds, and mammals. Typical wildlife species of the grass rolling upland include desert grassland whiptails, western box turtles, silky pocket mice, lesser earless lizards, prairie rattlesnakes, horned larks, lark buntings, western meadowlarks, silky pocket mice, eastern cottontails, and pronghorn.

Half-Shrub Hill: Half-shrub hill SHS occurs on slopes were vegetation is dominated by broom snakeweed, tarbush and other vegetation components such as burrograss. The 137 acres of this SHS only occur in Sierra County. Ecological condition and species diversity has not been identified for this SHS. Typical wildlife species of this SHS includes mourning dove, Gambel's quail, western whiptails, and mule deer.

Half-Shrub Rolling Upland: Half-shrub rolling uplands are composed mostly of broom snakeweed with few other shrub components such as Mormon tea and soap tree yucca. Sandy soils are dominated by honey mesquite and scattered grasses including tobosa grass, blue grama, and bush muhly. Forbs include leatherweed, globemallow, sandmat, and desert daisy. Ecological condition and species diversity has not been identified for this SHS. Typical wildlife species of the half-shrub rolling upland include side-blotch lizards, Merriam's kangaroo rats, and black-tailed jackrabbits.

Malpais-Rock/Lava: This SHS is composed of broken and cracked basalt lava beds. Grass is the dominant vegetation of the area. Dominant grass species include grama grasses, tobosa grass and dropseed. Shrubby vegetation is represented by broom snakeweed, Wright's buckwheat, four-wing saltbush, and littleleaf sumac. Ecological condition and species diversity is high for this SHS. Typical wildlife species of the malpais-rock/lava types include red-spotted toads, tree lizards, checkered whiptails, black-tailed rattlesnakes, canyon wrens, rock wrens, rock pocket mice, cottontails, and mule deer.

Mesquite Rolling Upland: The dominant plant species in this SHS is honey mesquite. Other shrub species associated with mesquite rolling upland include creosotebush, little leaf sumac, soaptree yucca, skunkbush sumac, Mormon tea, broom snakeweed, and four-wing saltbush. Tobosa grass is the dominant grass in this SHS. Vine mesquite, black grama, and bush muhly occur in lesser amounts. Species diversity is moderate for birds and mammals. Species diversity has not been identified for herptiles. Typical wildlife species of the mesquite rolling upland include western whiptails, coachwhips, common kingsnakes, western diamondback rattlesnakes, Gambel's quail, curve-billed thrashers, Chihuahuan ravens, white-throated woodrats, and black-tailed jackrabbits.

Mesquite Sand Dune: The dominant plant species in this SHS is honey mesquite. Other commonly associated plants include four-wing saltbush, sand sagebrush, broom snakeweed, and a variety of annual and perennial forbs. Grasses are typically scarce with mesa dropseed being most common. Dunes vary in height from 2 to 10 feet depending on soil depth. Species diversity is low for herptiles, birds, and mammals. Typical wildlife species of the mesquite sand dunes include western whiptails, coachwhips, common kingsnakes, western diamondback rattlesnakes, Gambel's quail, curve-billed thrashers, mourning doves, white-throated woodrats, and black-tailed jackrabbits. Oryx have become established in this habitat type in all three counties.

Mixed Shrub Hill: Dominant species of this SHS are desert-type shrubs with local occurrence of succulents including yuccas, beargrass, and cacti. Typical shrubs are broom snakeweed, honey mesquite, creosotebush, feather dalea, Wrights lemon verbena, mariola, and tarbush. Clumps of grama grasses are common. Species diversity is moderate for herptiles, birds, and mammals. Typical wildlife species of the mixed shrub hills include Great Plains toads, eastern fence lizards, Albert's towhees, rock squirrels, white-throated woodrats, and mule deer.

Mixed Shrub Mountain: Shrub species dominate the vegetation composition of this SHS along with an understory of grama grasses (*Bouteloua* spp.), bush muhly, slim tridens, and three-awn. Characteristic shrubs are broom snakeweed, whitethorn acacia, Apache plume, skunkbush sumac, and mountain mahogany. This SHS is located between surrounding uplands and below the piñon-juniper vegetation community. Species diversity is high for mammals, moderate for herptiles, and low for birds. Typical wildlife species of the mixed shrub mountain habitat type include tree lizards, Chihuahuan whiptails, Great Plains skinks, rock rattlesnakes, canyon wrens, white-throated swifts, rock squirrels, and mule deer. This is the primary habitat for exotic barbary sheep in the Las Cruces District.

Mixed Shrub Rolling Upland: Shrub species dominate the vegetation. Characteristic shrubs are broom snakeweed, whitethorn acacia, catclaw acacia, Apache plume, fragrant sumac, Wright's buckwheat, and mountain mahogany. Understory vegetation is composed mostly of grama grasses. The vegetation is similar to mixed shrub mountain species, but has more grasses and less shrub species. Species diversity is moderate for herptiles, birds, and mammals. Typical wildlife species of the mixed shrub rolling upland include Couch's spadefoots, green toads, western whiptails, Big Bend patch-nosed snakes, cactus wrens, crissal thrashers, eastern cottontails, and mule deer.

Piñon-Juniper Grass Mountain: Dominant plant species of this SHS are piñon pine and one-seed juniper with sparse to medium dense grass cover of gramas, muhlys, and three-awns grasses. The shrubs understory consists of mountain mahogany, oaks, rubber rabbitbrush, skunkbush sumac, and *Opuntia* species. Several annual and perennial forb species are represented. Species diversity is high for birds and moderate for mammals. Species diversity has not been identified for herptiles. Typical wildlife species associated with this SHS include Chihuahuan whiptail, Southern Prairie lizard, piñon jay, gray vireo, Montezuma quail, cliff chipmunk, piñon mouse, and mule deer.

Salt Flat: This SHS consists of areas that collect runoff water and have saline, gypsiferous, or highly alkaline soils. Vegetation is characteristically dominated by alkali sacaton, dropseeds, inland saltgrass, tobosa grass, and galleta grass. Forbs are common, with typical species consisting of seepweed, sunflowers, and Russian thistle. Species diversity is high for herptiles and low for birds.

3.3.7.2 Game Species

Big Game: Of the big game species found in New Mexico, those occurring within the *Planning Area* include mule deer, white-tailed deer, pronghorn antelope, desert bighorn sheep, javelina, mountain lion, and elk, which are found on BLM land at higher elevations. Exotic big game species found in the

Planning Area include oryx and barbary sheep. Within the *Planning Area*, mule deer can be found throughout forest and woodland, riparian, grasslands, and shrub-scrub habitat types. Data from NMDGF (2003) indicate that the State's mule deer populations have declined over the past 30 years for a variety of reasons, including changes in habitat conditions.

Pronghorn antelope occur within the *Planning Area*, primarily in grasslands. Grassland habitats currently occupied by pronghorn can be found in the Otero Mesa grasslands, Jornada del Muerto Basin, Tularosa Basin, and the Uvas/Nutt Valley area. Habitat requirements for pronghorn include grasslands that are in good ecological condition with an abundant supply of forbs, good visibility, and little topographic relief. Populations within the State have declined slightly, primarily due to drought (WAFWA 2006).

Mountain lions occur throughout a variety of habitat types within the *Planning Area*, but are most common where prey is abundant. Habitats suitable for the mountain lion require adequate habitat (sufficient browse) for mule deer or other prey species such as desert bighorn sheep. Hunting opportunities are managed by NMDGF based on the number of mountain lions in specified management zones. Hunting of mountain lions is permitted within desert bighorn sheep ranges year-round.

Desert bighorn sheep are found in dry, generally inaccessible mountainous areas, in foothills near rocky cliffs, and near seasonally available water sources. Bighorn sheep require access to freestanding water during the summer months, and throughout the year during drought conditions. The diet of bighorn sheep consists primarily of grasses, shrubs, and forbs. In 1998, the desert mountain ranges of the southwestern United States and Mexico were inhabited by an estimated 22,500 desert bighorn sheep (Toweill and Geist 1999). The subspecies found in New Mexico (*O. c. mexicana*) range from New Mexico west into southern Arizona and south into Sonora, Mexico. Desert bighorn number about 3,000 in Arizona (Wakeling 2003), approximately 2,000 in Mexico (Toweill and Geist 1999), and 340 to 396 (Rominger and Goldstein 2006) in New Mexico (as of spring 2003) (NMDGF 2003).

Within the *Planning Area*, desert bighorn sheep historically were found in the southern Sacramento Mountains, Brokeoff/Guadalupe Mountains, Organ Mountains, and West Potrillo Mountains. Potential suitable habitat was identified in the Caballo Mountains in August 2003 by the NMDGF in the *Plan for the Recovery of Desert Bighorn Sheep in New Mexico: 2003-2013* (NMDGF 2003). The species currently occurs in the Organ, Caballo, and Red House Mountains, where they have migrated from nearby reestablished populations in the San Andres Mountains north of the San Andres National Wildlife Refuge and the Fra Cristobal Mountains. The range of the desert bighorn sheep in Otero County has decreased because there is potential for disease transmission in areas where domestic sheep or goats graze. The NMDGF *2002-2013 Recovery Plan for Bighorn Sheep* identifies "*issues*" associated with recovery (i.e., transplants) of desert bighorn within potential unoccupied habitats. In addition to feral goats and domestic sheep issues in the Sacramento Mountains and the Guadalupe Mountains, the presence of exotic species (barbary sheep or aoudads) is also identified as a management constraint.

The oryx was released on White Sands Missile Range in 1969 as a game species. Since that time, the oryx population has grown and expanded its range beyond the White Sands Missile Range. The oryx is a native of Africa and is highly adapted to arid environments such as those found in the *Planning Area*. The species generally subsists on grassland vegetation as well as desert shrubs and forbs and has become well established in shrub-scrub habitats. The species can now be found in low numbers throughout the *Planning Area* east of Interstate 25. Due to the expansion of the species onto public land, the NMDGF authorizes hunting to control the population numbers.

Barbary sheep, a species native to northern Africa, was introduced on private land in the Hondo Valley in the 1950s. Subsequent introductions on private land and natural growth of these populations have led to its spread across rugged terrain over much of southeastern New Mexico. Barbary sheep are well adapted

to the rugged, barren, and dry shrub-scrub habitats also used by the native sheep. The species can be found throughout the rocky hills and steep mountains of Otero County and in small numbers east of the Rio Grande in Sierra and Doña Ana Counties. The NMDGF authorizes hunting of barbary sheep to control population numbers on public land.

Small Game: Common upland game bird species within the *Planning Area* that may be harvested legally in New Mexico include Gambel's quail, mourning dove, scaled quail, and Montezuma quail. Gambel's quail and scaled quail are found in brushy habitats and are generally associated with grasslands, shrub-scrub, and riparian habitats and Montezuma's quail in the higher elevations of the *Planning Area*.

Protected small game furbearers in the *Planning Area* include the following animals, which may be harvested for their fur subject to seasonal harvests outlined by the NMDGF: muskrat, beaver, weasel, raccoon, ringtail, fox, badger, and bobcat. Unprotected furbearers that have no seasonally limited harvest include skunk species and the coyote.

Other small game, sport fishes, migratory birds, and waterfowl also are managed and regulated by NMDGF. The population numbers of small game are known to fluctuate depending on multiple factors, but particularly due to the level of precipitation, available food, and residual cover for habitat. Other specifics pertaining to game animals and hunting can be obtained on the NMDGF's Web site at www.wildlife.state.nm.us.

3.3.7.3 Nongame Species

Diverse species of wildlife that are typical of the Chihuahuan Desert, Mexican Highlands, southern Rocky Mountains, and Mogollon Plateau regions occupy the various wildlife habitats in the *Planning Area*. The land cover types that compose the primary wildlife habitats in the *Planning Area* include forest and woodland, shrub-scrub, grassland, riparian, and barren areas.

Mammals: In addition to game species, common mammals in the *Planning Area* include a diverse array of rodents, including gophers, pocket mice, voles, wood rats, mice, kangaroo rats, tree, ground, and chipmunks. The desert cottontail, Manzano Mountain cottontail, and black-tailed jackrabbit are the three lagomorphs in the *Planning Area*. As many as four species of shrew, family Insectivora, occur in the *Planning Area*. These include the desert shrew, Merriam's shrew, dwarf shrew, and New Mexico shrew.

Numerous bat species are known to occur within the *Planning Area*, including the California myotis, Yuma myotis, Arizona myotis, southwestern myotis, fringed myotis, cave myotis, and long-legged myotis. Other species include the silver-haired bat, canyon bat, big brown bat, western red bat, hoary bat, spotted bat, Allen's big-eared bat, Townsend's big-eared bat, pallid bat, Mexican free-tailed bat, and big free-tailed bat.

Birds: A wide variety of bird species are found throughout the *Planning Area*, including many resident, migratory, wintering, and transient species. With a high diversity of habitats, New Mexico has recorded the second-highest number of bird species of any landlocked state in the United States. More than 280 bird species breed in New Mexico, and the extensive grasslands are important for wintering birds. Riparian habitats, such as those found in the Rio Grande Valley, serve as important flyways and stopover areas for migratory bird species.

Bird species within the *Planning Area* occur in all habitat types and are most abundant in riparian areas, which are used for nesting, breeding, and foraging, and as migration corridors for many species. Bird species that commonly occur within the *Planning Area* include the horned lark, meadowlark, cactus wren canyon wren, rock wren, Chihuahuan raven, curve-billed thrasher, crissal thrasher, and Albert's towhee.

Migratory, wintering, and transient bird species also occur throughout the *Planning Area*. These birds receive protection under Executive Order 13186 (66 Code of Federal Regulations [CFR] 3853) and the Migratory Bird Treaty Act (Title 16 United States Code [U.S.C.] 703-711). Migratory species likely to occur in the *Planning Area* include the lark bunting, black-chinned sparrow, and gray vireo. Migratory species depend on high-quality habitats that contain adequate nesting substrate with sufficient cover to hide the female on the nest, diverse vegetation to supply insects during brood rearing, and seeds or fruits (for some species) for the remainder of the year.

Raptors known to exist within the *Planning Area* include the golden eagle, bald eagle, Cooper's hawk, sharp-shinned hawk, northern harrier, ferruginous hawk, red-tailed hawk, rough-legged hawk, Swainson's hawk, common black hawk, prairie falcon, peregrine falcon, merlin, American kestrel, turkey vulture, and aplomado falcon.

Reptiles and Amphibians: Reptiles and amphibians are well represented within the *Planning Area* and are found throughout the various habitat types. Rattlesnakes are common throughout many parts of the *Planning Area*, and species that may occur include the western diamondback rattlesnake, black-tailed rattlesnake, prairie rattlesnake, and rock rattlesnake. Other snake species include the Big Bend patch-nosed snake, gopher snake, common king snake, checkered garter snake, and black-necked garter snake. There are many species of lizards, including whiptails and skinks, which occur within the *Planning Area*. Species that are likely to be found include the western whiptail, checkered whiptail, Chihuahuan whiptail, Great Plains skink, side-blotched lizard, tree lizard, and prairie lizard.

Amphibians are present within the *Planning Area*, although to a lesser extent than reptiles. Species that occur in the *Planning Area* include the northern leopard frog, red-spotted toad, Great Plains toad, green toad, and Couch's spadefoot toad.

Fish: Approximately 41 fish species occur within the *Planning Area*; few reaches of fish-bearing streams occur on BLM-administered public land because of desert environment and the fragmented ownership pattern. The fish-bearing reaches of streams in the *Planning Area* mostly occur on land under other Federal (primarily Forest Service), State trust, or private jurisdiction. Primary fish bearing streams in the *Planning Area* are the Rio Grande in Sierra and Doña Ana Counties, Percha Creek and Palomas Creek in Sierra County, and Tularosa Creek in Otero County. Game fish species include the rainbow trout and brown trout found in Tularosa Creek. Warm-water game fish species are mostly found in Elephant Butte and Caballo reservoirs. These species include smallmouth bass, white bass, flathead catfish, channel catfish, blue catfish, bluegill, smallmouth buffalo, and crappie. Nongame fish species include longnose dace, fathead minnow, Rio Grande sucker, and Rio Grande chub.

3.3.8 SPECIAL STATUS SPECIES

Special status species are plant and animal Federally-listed or proposed and Bureau sensitive species, which include both Federal candidate species and delisted species within 5 years of delisting (BLM Manual 6840).

Known geographic distribution and habitat requirements were considered for each species in comparison with habitat types in the *Planning Area*. The results of this analysis are that 78 special status animal species potentially occur within the *Planning Area* (Appendix I, Table I-1) including 36 State-listed species. State-listed species are currently not considered special status species unless they are listed as Federally-Endangered, Threatened, proposed, or candidate. The BLM State Director periodically reviews and updates the sensitive species list. Appendix I lists counties of known occurrence for special status and State-listed species.

The presence of special status plant species and their habitats in the *Planning Area* were considered using Las Cruces District species occurrence/habitat records and New Mexico Natural Heritage Program species records. Species descriptions and distributions were derived from Las Cruces District office records and the New Mexico Rare Plant Technical Council [NMRPTC 1999: New Mexico Rare Plants. Albuquerque, NM: New Mexico Rare Plants Home Page http://nmrareplants.unm.edu (Latest update: 18 January 2006)]. Based on evaluation of the above information, 41 special status species plus an additional 44 State-listed plant species or habitats could occur in the *Planning Area* (Appendix I).

3.3.8.1 Federally-Listed Threatened and Endangered Birds

Northern Aplomado Falcon: In the United States, aplomado falcons (*Falco femoralis*) historically occurred in southern Texas, southern New Mexico, and southeastern Arizona. Although aplomado falcons once were considered fairly common throughout their range in the United States, populations declined rapidly after the 1930s, and the aplomado falcon was Federally-listed as endangered in 1986. The falcon was extirpated from its northern range due to high levels of pesticide contamination in the eastern Mexico population and to habitat loss from agricultural development and changes to the vegetation community. Starting in the early 1990s, increases in reliable falcon sightings prompted additional interest in recovery of the species in New Mexico. At that time, the closest known free-ranging population to New Mexico was in northern Chihuahua, Mexico (Young et al. 2002). In 2006, the USFWS approved a proposal to release a nonessential experimental population of aplomado falcons in Arizona and all of New Mexico under the Endangered Species Act (ESA)'s 10(j) rule.

Within New Mexico, aplomado falcons historically were reported from Sierra, Otero, Doña Ana, Eddy, Grant, Hidalgo, Lea, and Luna Counties. The species formerly occurred regularly in summer (casually in winter) in the Southwest and possibly reached as far east as the Tularosa Basin, with the last specimen taken in 1939 and the last nesting documented in 2002 (Young et al. 2002). Historical sightings are concentrated in the *Planning Area* in the southwestern corner of New Mexico from Sierra and Doña Ana Counties to the "*bootheel*" region.

There have been sightings of aplomado falcons in Otero County in 2005 and subsequent years (NMDGF 2007, Meyer 2008). To date, 316 captive-hatched aplomado falcons have been released in New Mexico since 2006, although most of these releases have been outside the *Planning Area*. Falcon releases have occurred in Sierra County, but not in Doña Ana or Otero Counties. To date, these releases have not resulted in known aplomado falcon nests in the *Planning Area*.

Least Tern (Interior Population): The least tern (*Sterna antillarum*) is a robin-sized bird found along the playa lakes of New Mexico; the sandbars and shorelines of the river systems of the Colorado (Texas), Red, Rio Grande (Texas), Arkansas, Missouri, Ohio, and Mississippi; the braided rivers of southwest Kansas and northwest Oklahoma; and the salt flats in northwest Oklahoma (USFWS 1985a). The interior least tern was Federally-listed as endangered on May 28, 1985, as being without critical habitat (50 FR 21784; USFWS 1985a). Riverine areas with sparsely vegetated sand-and-gravel bars or salt flats along shorelines provide nesting habitat for the interior least tern.

Modifications of riverine systems from channelization, surface impoundments, and irrigation have led to the loss of much of the interior least tern's habitat. Increased recreational use of sandbars also has caused disturbance of nesting birds. In New Mexico, the interior least tern is found as a summer resident mainly in the southeast, in and around Bitter Lake National Wildlife Refuge. Presently, the only known nesting population is in Chaves County along the Pecos River within the Bitter Lake National Wildlife Refuge. However, it also occurs as a rare vagrant at other wetlands in the State. Within the *Planning Area*, the least tern is found occasionally on playa lakes.

Mexican Spotted Owl: The Mexican spotted owl (*Strix occidentalis lucida*) is one of three subspecies of spotted owl found from western Canada to central Mexico. In response to declines in populations of Mexican spotted owls, due primarily to alteration and fragmentation of their habitat and the threat of catastrophic forest fire events, the species was Federally-listed as threatened throughout its range on March 16, 1993 (58 FR 14248). The most recent critical habitat designation for the species was published on August 31, 2004, and remains in effect (69 FR 53181).

The most serious threat to Mexican spotted owls appears to be habitat loss due to human activities. Historically, this species occupied low-elevation riparian forests, but these forests are now drastically altered or destroyed in most areas of the Southwest. The loss of riparian areas eliminated dispersal opportunities between isolated mountain ranges and breeding areas. The harvesting of wood for fuel eliminated or altered owl habitat in ponderosa pine forests, where large Gambel oaks once provided shade, nesting, and roosting habitat. As more of these trees were harvested, important habitat components for the owl were eliminated (Ganey 1998). Currently, there are additional threats to the owl, including grazing; agriculture or development for human habitation; forest insects; recreational activity; road development; and oil, gas, and mining development (USFWS 1995b).

Typically, Mexican spotted owls occupy a variety of habitats for breeding and foraging. They breed in dense, old-growth mixed-conifer forests along steep slopes and ravines. Within this habitat, the trees form a closed canopy, have a high basal area, and contain numerous downed logs and snags. The large trees provide suitable nest cavities, and the combination of numerous smaller trees with large trees provides roosting and foraging habitat (USFWS 2004).

In New Mexico, the Mexican spotted owl has been recorded in all montane regions from the San Juan, Jemez, and Sangre de Cristo mountains in the north to the Guadalupe and Animas mountains in the south. The largest concentration occurs in the Mogollon and Sacramento mountains, but other sightings include Mountainair, lower San Francisco Valley, Grants, Hurley, Burro Mountains, and San Andres National Wildlife Refuge (USFWS 2004). Within the *Planning Area*, the Mexican spotted owl may occur in piñon-juniper and cliff habitats; however, there are no known nest sites or activity centers.

Southwestern Willow Flycatcher: One of four recognized willow flycatcher subspecies (Browning 1993) the southwestern willow flycatcher (*Empidonax traillii extimus*) is a neotropical migratory species that breeds in the southwestern United States from mid-April to early September and migrates to wintering grounds in Mexico, Central America, and portions of South America during the nonbreeding season (Ridgely and Tudor 1994).

In response to the dramatic decrease in the number of southwestern willow flycatchers in the southwestern states, the USFWS proposed to list the species as endangered on July 23, 1993. The species was subsequently listed as Federally-endangered on February 27, 1995 (60 FR 10694), under the ESA of 1973, as amended. Critical habitat was designated formally for the species on October 19, 2005, which included 15 management units totaling 737 miles of river in New Mexico, Arizona, California, Nevada, and Utah (70 FR 60886). Critical habitat for the southwestern willow flycatcher was not designated within the *Planning Area*. The USFWS is currently revising the critical habitat rule for the southwestern willow flycatcher (FR Volume 76, No. 157, 50541-50629) to include the Rio Grande Valley north of Leasburg Dam in the *Planning Area*.

Throughout its range, the southwestern willow flycatcher has shown both historical and recent population declines. The most significant factor in the cause of these declines is the extensive loss, fragmentation, and adverse modification of its riparian breeding habitat, particularly cottonwood-willow associations (Unitt 1987; USFWS 1995b). Losses have occurred in association with urban and agricultural development, livestock grazing, off-highway vehicle use and recreation, replacement of native habitats

by introduced plant species, fire, water diversion and impoundment, and hydrological changes resulting from these and other land uses (Tibbitts et al. 1994; USFWS 1993). Brood parasitism by the brown-headed cowbird is another major threat to the southwestern willow flycatcher (Brown 1988; Sogge 1995; USFWS 1993, 1995b).

The southwestern willow flycatcher is a riparian obligate that breeds along rivers, streams, and other wetlands where a dense growth of willow (*Salix* spp.), seepwillow, buttonbush, boxelder, saltcedar, or other similarly structured riparian vegetation is present, often with a scattered overstory of cottonwood). Southwestern willow flycatchers in low-elevation riparian systems are associated with both tamarisk and cottonwood-willow riparian forests (Hubbard 1987; Sogge et al. 1997; Paradzick and Woodward 2003).

Within the *Planning Area*, the southwestern willow flycatcher is found on private land, State trust land, and Federal land administered by the Bureau of Reclamation in the Rio Grande Valley. There are no known records of southwestern willow flycatcher on BLM-administered public land in the *Planning Area* where there is very little potential habitat for the species.

Yellow-Billed Cuckoo: The western yellow-billed cuckoo (*Coccyzus americanus*) is a medium-sized neotropical migratory bird. The yellow-billed cuckoo historically ranged from southern British Columbia to northern Mexico (Bent 1940). The species was common and widespread in California and Arizona and was found locally in New Mexico, Oregon, Washington, western Colorado, western Wyoming, Idaho, Nevada, and Utah. Due to decreases in the western distinct population segment of yellow-billed cuckoos, it was proposed for listing as a Category 2 threatened or endangered species (47 FR 58458). In 2001, the species was determined to warrant listing under the ESA, but it was precluded due to other, higher-priority listing actions (66 FR 38611).

The western yellow-billed cuckoo breeds in large blocks of riparian habitats, especially in cottonwood-willow woodlands (Ehrlich et al. 1988). Cottonwood trees provide important foraging habitat for the species, and a dense understory of vegetation is important for nest-site selection. Nesting in the western United States occurs close to water, possibly due to humidity requirements for hatching and rearing young (Hamilton and Hamilton 1965; Rosenberg et al. 1991).

Habitat loss, fragmentation from groundwater pumping, surface-water impoundment, agricultural and urban conversion, invasive species, and overgrazing are the main threats to survival of the western yellow-billed cuckoo. Fragmentation effects include the loss of patches of habitat large enough to sustain local populations, leading to local extinctions and the potential loss of migratory corridors, which in turn affect the ability of the species to recolonize habitat patches (Hunter et al. 1987).

This species was historically rare in New Mexico, but locally common along the Pecos River and Rio Grande, as well as uncommon to common locally along portions of the Gila, San Francisco, and San Juan rivers. In the mid-1980s, the species was fairly common along the Pecos River and along the Rio Grande between Albuquerque and Elephant Butte Reservoir. The yellow-billed cuckoo is a known resident in the *Planning Area*. Yellow-billed cuckoos have been seen near Percha Dam State Park and Elephant Butte State Park in Sierra County, near Three Rivers and Otero Mesa in Otero County, and along the Rio Grande in Doña Ana County (New Mexico Ornithological Society 2007).

3.3.8.2 Federally-Listed Threatened and Endangered Reptiles/Amphibians

Chiricahua Leopard Frog: One of nearly 30 recognized species in North America under the genus *Lithobates*, the Chiricahua leopard frog (*Lithobates* {*Rana*} *chiricahuensis*) is a medium- to large-sized frog that is endemic to wetlands in southern and central Arizona, western New Mexico, and northern Mexico. The Chiricahua leopard frog became Federally-listed as threatened on July 13, 2002 (67 FR

40789), under the ESA of 1973, as amended. Concurrent with this decision, the USFWS published a special rule under Section 4(d) of the ESA, stating that take of the Chiricahua leopard frog caused by livestock use of or maintenance activities at livestock tanks located on private, State trust, or Tribal lands would be exempt from the prohibition of Section 9 of the ESA (67 FR 40789).

The Chiricahua leopard frog is considered to be an aquatic habitat generalist, occurring in a wide variety of habitats at a wide range of altitudes in pine and pine-oak forests with permanent water. It lives and breeds in a variety of aquatic habitats, including cienegas, pools, livestock tanks, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet, where adequate depth enables escape from predators (Frost and Bagnara 1977; Scott and Jennings 1985; Zweifel 1968).

Throughout its range, the Chiricahua leopard frog has shown both historical and recent population declines. Although causes of the species' decline are not entirely clear, it is believed that it is threatened by the cumulative effects of the loss, fragmentation, and adverse modification of riparian and wetland habitats; environmental contamination; disease; and predation by introduced, nonnative bullfrogs and fish. Habitat loss from water diversions, dams, groundwater pumping, livestock grazing, mining, urban and agricultural development, and road construction have contributed to reduced quality and quantity of riparian and wetland habitat (Belsky and Blumenthal 1997; Ohmart 1995). In addition, disease is another factor implicated in population declines of the Chiricahua leopard frog. Postmetamorphic Death Syndrome has been implicated in the extirpation of several Chiricahua leopard frog populations in New Mexico (Declining Amphibian Populations Task Force 1993). Problems associated with small population numbers and size also threaten the species. Additional evidence suggests that adverse effects from waterborne contaminants and problems associated with small population numbers and size also may threaten this species (USFWS 2002a).

The historical range of the Chiricahua leopard frog extended across portions of southern and central Arizona, western New Mexico, and northern Mexico. The species is known historically from some 231 sites in Arizona, 182 sites in New Mexico, and about 12 sites in Mexico. The Chiricahua leopard frog is now absent from more than 75 percent of its historical sites, including numerous mountain ranges, valleys, and drainages within its former range. In areas where it is still present, populations are often small, widely scattered, and occupy marginal and dynamic habitats (USFWS 2002a).

The current range of the Chiricahua leopard frog is divided into two population segments: (1) a southern population located in mountains and valleys south of the Gila River in southeastern Arizona, extreme southwestern New Mexico, and Mexico; and (2) northern montane populations in west-central New Mexico and along the Mogollon Rim in central and eastern Arizona (Platz and Mecham 1979).

This species is found in the southwestern portion of New Mexico and is most abundant in the Gila and San Francisco river drainages. Other localities include the Mimbres River drainage in Grant and Luna Counties and the numerous stock tanks and intermittent creeks of southwestern Hidalgo County. Chiricahua leopard frogs may be found in the northwestern portion of the *Planning Area* within Sierra County. Populations are known to occur in Cuchillo Creek and in at least three other drainages (and in dirt tanks in the vicinity of these drainages) in the *Planning Area*, mostly on private land. One breeding population occurs on BLM public land.

3.3.8.3 Federally-Listed Threatened and Endangered Plants

Kuenzler's Hedgehog Cactus: Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*) is known to occur in only four counties in New Mexico. The species is found in piñon-juniper habitat at elevations from 5,200 feet to 6,600 feet, typically on southern to southeastern aspects (USFWS 1985b). The cactus was Federally-listed as endangered in 1979, with no critical habitat, and the recovery plan was

completed in 1985. There are currently seven documented locales where the cactus is found (Blue Earth Ecological Consultants 2002). The total number of known plants found on land administered by Forest Service and BLM is approximately 1,600 (Chauvin et al. 2001).

The cactus was considered to be near extinction in the early 1980s, with population estimates below 500 plants. The plant is threatened by private and commercial collection and by destruction caused by livestock, OHVs, and road construction (Fletcher 1985). By 2005, over 2,200 plants had been documented, and the species is recommended for down listing from endangered to threatened (USFWS 2005). This would not affect BLMs management and protection of habitat, populations, or plants. Kuenzler's hedgehog cactus is known to occur in the *Planning Area* in extreme northeastern Otero County on the eastern flank of the Guadalupe Mountains; however, additional potential habitat exists in Otero County in the limestone hills of the southern Sacramento Mountains above 5,200 feet in elevation.

Sacramento Prickly Poppy: The Sacramento prickly poppy (*Argemone pinnatisecta*) is a robust herbaceous perennial that occurs from the Chihuahuan Desert through the piñon-juniper zone to the lower edge of ponderosa pine forests (4,300 feet to 7,100 feet). It is found only in Otero County on the western slope of the Sacramento Mountains between Escondido Canyon and La Luz Creek. Within this area, the poppy occurs in seven canyon systems. The poppy is adapted to disturbance and is often found in sites that have been recently disturbed and have enhanced soil-moisture conditions. The poppy was listed as Federally-endangered in 1989, without critical habitat, and the recovery plan was completed in 1994 (USFWS 1994).

Major threats identified in the recovery plan include road construction, road maintenance (mowing and herbicide use), OHVs, trampling by livestock, drought, and flash floods (USFWS 1994). Additionally, a fungal stem canker was found in some plants that led to failure to set fruit and then death of the plant (USFWS 2009).

Sneed Pincushion Cactus: The Sneed pincushion cactus (*Coryphantha sneedii* var. *sneedii)* is found in the northern Chihuahuan Desert east of Las Cruces, New Mexico, and north of El Paso, Texas (50 CFR 64741). The Sneed pincushion cactus was Federally-listed as endangered without critical habitat in 1979. All known populations are located in Doña Ana County, New Mexico, and El Paso County, Texas.

The Sneed pincushion cactus range is from the southern Organ Mountains and Bishop's Cap east of Las Cruces, New Mexico, and from the Franklin Mountains north of El Paso, Texas. The cactus is generally found in grasslands and shrub-scrub on limestone outcrops and rocky slopes. Threats to Sneed pincushion cactus include habitat destruction and modification, illegal collection, disease and predation, and limited distribution on limestone-derived soils. Within the *Planning Area*, the species occurs in the Fusselman dolomite of the Organ and Franklin Mountains.

Todsen's Pennyroyal: Todsen's pennyroyal (*Hedeoma todsenii*) is a perennial herb found in the Great Basin conifer-woodland community in Texas and New Mexico (USFWS 2001). Due to its extremely restricted range and small population size, Todsen's pennyroyal was listed as Federally-endangered in 1981 with critical habitat. The two critical habitat units are 250 acres each and are located on the White Sands Missile Range, which is managed by the U.S. Department of Defense (DOD). A recovery plan for Todsen's pennyroyal was approved in 1985 (USFWS 2001).

Potential threats to the species include soil erosion, minerals exploration, military activities, illegal grazing, and changes in land use management. There do not appear to be any immediate threats to the pennyroyal sites from the three land managing agencies (USFWS, BLM, and DOD), and if present management continues, it is likely that natural threats will have a greater potential than human activities

to cause extinction of the species. Natural threats include low sexual reproduction, limited suitable habitat, wildfire, and limited dispersal ability (USFWS 2001).

Todsen's pennyroyal is known to exist in the San Andres and Sacramento mountain ranges of southern New Mexico. There are 14 known colonies (M. Howard 2011) in the San Andres Mountains, all on the White Sands Missile Range in Sierra County, New Mexico. There are 15 sites in the Sacramento Mountains in Otero County, New Mexico, that are under the management of the Forest Service, Lincoln National Forest, and the BLM Las Cruces District Office. There are eight sites near Domingo Peak and seven near Mountain Lion Peak (USFWS 2001). Todsen's pennyroyal is found at elevations between 6,200 and 7,400 feet within the Sacramento Mountains. Gypseous-limestone soils occurs at all known Todsen's pennyroyal sites. The species occurs southeast of Tularosa in Otero County and potentially on the western slopes of the San Andres Mountains in Sierra County.

3.3.9 CULTURAL RESOURCES

Cultural resources are prehistoric or historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. Cultural resources include archaeological resources, historic architectural and engineering resources, and traditional cultural resources. Archaeological resources are areas where prehistoric or historic activity altered the earth or where deposits of physical remains (e.g., arrowheads, pottery) have been discovered. Architectural and engineering resources include standing buildings, districts, bridges, dams, and other structures of historic or aesthetic significance. Traditional cultural resources can include archaeological resources, structures, topographic features, habitats, plants, wildlife, and minerals that American Indians or other groups consider essential for the preservation of traditional culture.

3.3.9.1 Cultural History

The cultural history of the *Planning Area* extends back in time approximately 12,000 years and perhaps longer based on excavations in Pendejo Cave in Otero County (MacNeish and Libby 2004). Paleoindians, the earliest well-documented occupants, occupied the region from about 10,000 to 7,000 or 6,000 B.C. Paleoindian phases or complexes (such as, Clovis, Folsom, Midland, Belen, Portales, Firstview, Cody, and Eden) have been defined primarily on the basis of different styles of stone points used on spears or darts for hunting. The distinctive projectile points are the most common evidence of this period, but they often are found in isolation without other archaeological remains or are mixed with later deposits, suggesting the points were collected and perhaps reused by later occupants of the region.

Archaeologists call the long period from about 7,000 or 6,000 B.C. to about A.D. 200 the Archaic era. The Archaic era represents a continuation of the Paleoindian subsistence strategy of hunting game and gathering indigenous plant foods. The Archaic era commonly is divided into three or four periods based on changing styles of projectile points, but the overall hunting and gathering adaptation appears to have been quite stable.

The subsequent period from about A.D. 200 to about 1400 or 1500 is called the Ceramic or Formative era. The Formative era represents an era of increased population, increased reliance on farming, and less mobile populations who occupied more settlements year round. Most of the Formative sites in the western part of the *Planning Area* are classified as Mimbres. The Formative era is divided into the Early and Late Pit House Periods. The Early Pit House period (Cumbre phase in the Mimbres Valley), which dated from about A.D. 200 to 550, represents groups who lived in small villages, often on high, steep-sided knolls and mesas. The Late Pit House period is dated from about A.D. 550 to 1000, and is further divided into three phases primarily on the basis of changing types of pottery.

The Jornada and Mimbres branches of the Mogollon cultural system appear to have collapsed in the mid-1400s, or at least changed so drastically that they left an essentially invisible archaeological record. When the first Spanish expeditions passed through south-central New Mexico in the 1580s, they encountered various groups of hunters and gatherers. These native groups subsequently were devastated by warfare and disease or were largely blended into Mexican or Apache societies. Descendants of Piro and Tigua (or Tiwa), who moved south with the Spanish when the Pueblo Revolt of 1680 drove them out of New Mexico, reside at Ysleta del Sur Pueblo on the southern edge of El Paso, Texas. A composite community of Tigua, Piro, and Manso Indians formed a daughter colony known as Tortugas in Las Cruces, sometime between 1850 and 1900. Tortugas was formally incorporated in 1914, but the Federal government has not approved the colony's request for formal recognition as an American Indian tribe.

By the late 1500s (and perhaps earlier), Athapascan-speaking people moved into southern New Mexico and came to dominate this territory. The Athapascan speakers differentiated into the Navajo and several groups of Apaches. The Chiricahua Apache occupied the western parts of the *Planning Area* west of the Rio Grande and the Mescalero Apache occupied areas to the east.

The first Spanish explorers entered what is now New Mexico in the early sixteenth century, but left after finding no mineral wealth and did not return to settle the area until late in the century. A major route of travel between Mexico and the New Mexican colony—El Camino Real de Tierra Adentro (Inland Royal Road) or Chihuahua Trail—developed along the Rio Grande at that time.

Once the New Mexico Territory became part of the United States after the Mexican War, the Federal government invested considerable effort in establishing military posts to explore and map the country, describe local resources, and identify the best routes of travel, as well as to protect new settlers from Apache raids. Fort Bliss, Fort Fillmore, Fort Thorn, and Fort Craig were established in the Rio Grande Valley in 1853 and 1854 to protect immigrants moving west as well as travelers along the north-south Camino Real. In the late 1850s, Hispanics cautiously began to expand farther north along the Rio Grande. After the Civil War ended and more troops became available, the presence of the U.S. Army provided protection for travel through the region. One of the more famous routes was the Butterfield Overland Mail Company road, which John Butterfield established as a mail and passenger service from St. Louis to San Francisco in 1858.

Gold, silver, and copper were mined in the Tularosa and High Rolls Districts of the Sacramento Mountains in eastern Otero County, and in the Jarilla Mountains in western Otero County. More substantial mining efforts focused on the eastern slopes of the Black Range, where the discovery of gold and silver in the 1870s and 1880s led to establishment of numerous mining communities in western Sierra County, including Winston, Chloride, Kingston, Hillsboro, and Lake Valley. Ranching is a major theme of historic Euro-American settlement of the uplands. Large-scale cattle ranching dates only from the 1880s, although some livestock, particularly sheep, were raised in conjunction with the agricultural communities in the Rio Grande Valley. Early ranching was an expansion of the Texas cattle industry, and most ranching soon was consolidated into large, corporate ranches financed by Eastern and European capital. In 1916, the Bureau of Reclamation completed construction of Elephant Butte Dam on the Rio Grande, and stabilized the water supply for irrigation agriculture that was used particularly for raising cotton and alfalfa, as well as vegetables and pecans. Agriculture continues to be important to the regional economy.

The White Sands Proving Ground (now White Sands Missile Range) was established in 1945. On July 16 of that year, the world's first atomic bomb was detonated on the north end of the Range. Military training and research continues to be a prominent activity within the *Planning Area*.

3.3.9.2 Archaeological and Historical Sites

Information about the status of the inventory and evaluation of cultural resources within the *Planning Area* was compiled from two sources: (1) annual reports of the BLM cultural resource program, and (2) the New Mexico Cultural Resource Information System (NMCRIS). Both sources of information are incomplete and have limitations, but they provide a basis for characterizing and making approximate estimate of the numbers of the cultural resources of the *Planning Area*.

When the *White Sands RMP* was prepared in 1985, it was estimated that less than 0.2 percent of Sierra and Otero Counties, and less than 1 percent of the public land in those counties, had been surveyed for cultural resources. The RMP stated that 10 historic and 129 prehistoric sites had been recorded at that time on public land within those counties. Summary information for selected large surveys that, in the aggregate, had covered about 50 square miles, indicated that the densities of archaeological and historical sites varied from about 1 to more than 60 per square mile, with an average density of almost 5 sites per square mile. Those numbers suggest there could be more than 50,000 archaeological and historical sites in those two counties. No comparable statistics were compiled when the *Mimbres RMP* was issued in 1993.

Based on the BLM annual reports, it is estimated that since 1986 the BLM cultural resource program conducted cultural resource survey of almost 19,900 acres (31 square miles) of public land within Sierra and Otero Counties, recording more than 381 archaeological and historical sites. Survey projects included in the BLM annual reports are not limited to public land, because some projects within the purview of BLM review also cross non-public land. The annual reports indicate that almost 11,000 acres (17 square miles) of non-public land was surveyed, and more than 200 archaeological and historical sites were recorded in conjunction with those surveys. Based on the number of sites recorded by documented surveys, the estimated average site density on public land in Otero and Sierra Counties is three sites per square mile, compared with four sites per square mile for both counties. Those averages suggest there are more than 40,000 archaeological and historical sites in Otero and Sierra Counties. Based on the BLM annual reports, it is estimated that since 1993 the BLM cultural resource program surveyed about 12,480 acres (20 square miles) of public land within Doña Ana County, recording more than 164 archaeological and historical sites. About 7,170 acres (11 square miles) of non-public land was surveyed as part of projects within the purview of BLM review, and almost 139 archaeological and historical sites were recorded in conjunction with those surveys.

The NMCRIS database includes information about 3,838 archaeological and historical sites recorded in Doña Ana County, and 1,077 of those are on public land. The data indicate that 4 percent of the public land has been surveyed for cultural resources compared to 5 percent for the entire county. Although public land constitutes 46 percent of Doña Ana County, the archaeological and historical sites on public land constitute only 28 percent of the sites recorded within the county.

About 66 percent of the sites recorded on public land are in areas that are not documented in the NMCRIS database as having been surveyed, and about 68 percent of all sites recorded within Doña Ana County are not associated with documented surveys. This probably reflects early (pre-1970s) inventories that did not rigorously document survey areas, or the fact that information about some survey projects has not yet been entered into the NMCRIS database. Based on sites recorded by documented surveys in the NMCRIS database, it is estimated that the average site density on public land in Doña Ana County is six sites per square mile, which is the same as the estimated average density for the entire county. Those averages suggest there are approximately 20,000 to 25,000 archaeological sites in Doña Ana County, more than 10,000 of them on public land, with approximately 85 to 90 percent yet to be recorded.

3.3.9.3 Traditional Cultural Properties

Federally-recognized tribes in or near the *Planning Area* include the Mescalero Apache, who reside on the Mescalero Indian Reservation in Otero County, and Ysleta del Sur Pueblo (Tigua Reservation), located southeast of El Paso, Texas. The Tortugas, a composite community of Tigua, Piro, and Manso Indians and Hispanics, is a daughter colony of Ysleta del Sur Pueblo that formed in Las Cruces sometime between 1850 and 1900. Although the Tortugas formally incorporated in 1914, the Federal government has not recognized the community as an American Indian tribe.

Tribes that have expressed traditional cultural interests in the *Planning Area* or that historically used the *Planning Area* include the Hopi Tribe, Navajo Nation, Fort Sill Apache Tribe, White Mountain Apache Tribe, Kiowa Tribe, Comanche Indian Tribe, Isleta Pueblo, Pueblo Isleta del Sur, Acoma Pueblo, Laguna Pueblo, Tesuque Pueblo, and Zuni Pueblo.

3.3.9.4 Special Status Cultural Resources

Not all cultural resources are significant. Since the mid-1980s, criteria for inclusion in the National Register of Historic Places (National Register) have been used broadly for evaluating the significance of archaeological and historical sites, although BLM also has a system of allocating sites to various uses as another measure of significance. The annual reports indicate approximately 80 to 90 percent of the sites recorded in the study area have been evaluated as eligible for the National Register, which indicates they are worthy of preservation in place or the information they contain is worthy of recovery and preservation. Some cultural resources have special status designations, including National monuments, National historic sites, and cultural ACECs, as well as actual listing in the National Register. Resources determined eligible for the National Register are afforded the same consideration as those that are actually listed, but the additional effort entailed in listing properties often reflects a higher degree of publicly perceived significance or sentiment for preservation in place. Table 3-18 lists the types of special status cultural resources located within the *Planning Area*.

The White Sands National Monument is managed by the National Park Service (NPS) and is the only National monument in the *Planning Area*. It overlaps the boundary of Otero and Doña Ana Counties along U.S. Highway 70 about 15 miles southwest of Alamogordo. The Monument was set aside primarily for a natural feature--the largest gypsum dune field in the world--but the NPS also manages the cultural resources of the Monument for restoration, protection, maintenance, public visitation, and education. A White Sands Monument National Historic District also has been defined.

3.3.9.5 Management of Cultural Resources

The degree of management of cultural resources within the *TriCounty* area is commensurate with the scientific or socio-cultural values of the resource, the degree of threat, and the resources' vulnerability. Under this concept, Las Cruces District attempts to protect a representative sample of the full array of cultural resources, both historic and prehistoric, found within the *Decision Area*. Federal laws such as the *National Historic Preservation Act* (NHPA) of 1966, the *Archeological Resources Protection Act* (ARPA) of 1979, the *American Indian Religious Freedom Act* (AIRFA) of 1978, the *Native American Graves Protection and Repatriation Act* (NAGPRA) of 1990, and *Federal Land Policy and Management Act* of 1976 (FLPMA) provide for the protection and management cultural resources on public land.

TABLE 3-18 SPECIAL STATUS CULTURAL RESOURCES IN THE *PLANNING AREA*	
TYPE	**SITE NAME**
National Monuments	Prehistoric Trackways National Monument
National Historic Trails	El Camino Real de Tierra Adentro
New Mexico State Register of Cultural Properties	Three Rivers Petroglyph Site Alamo Spring Stage Station Lake Valley Mining District Lake Valley Schoolhouse Escondida Ruin [on McGregor Range] Archaeological sites LA 1082 near Derry and LA 50751 near Arrey
Area of Critical Environmental Concern	Three Rivers Petroglyph Site Cornudas Mountain Alamo Mountain Los Tules Rincon San Diego Mountains Wind Mountain Doña Ana Mountains Organ/Franklin Mountains
Backcountry Byway	Lake Valley
SOURCES: New Mexico Historic Preservation Division 2005; National Park Service 2005	

These laws and their implementing regulations determine how the NHPA shall be implemented by Federal agencies, State Historic Preservation Officers, and the Advisory Council. The BLM implements this process under a National Programmatic Agreement, and in New Mexico a Protocol Agreement with the New Mexico State Historic Preservation Office which further defines these roles.

Archeological and historic resources are evaluated initially under the eligibility criteria of the National Register. Sites listed or eligible for the National Register are managed under BLM procedures which have been developed in conformance with relevant laws and regulations. This may include designating and managing the area as an ACEC, closing or limiting the area to vehicle use, closing or limiting the area to mineral development, or other management actions.

To date, no tribes have formally identified traditional cultural properties (TCPs) within the *Decision Area*. Tribes are often reluctant to identify, locate, or say why a particular site or landscape has special significance. Regardless, any TCPs that might be recognized by a tribe at any time during BLM's resource management planning would be managed in accordance with the NHPA, AIRFA and NAGPRA, and relevant regulations which take into account concerns in the implementation of ARPA. The consultation with American Indian tribes concerning sites and locations of religious or cultural interest is ongoing in all BLM actions which may impact these values, and is intended to consider sites allocated under traditional use allocations, including preparing this RMP amendment and revision.

The BLM is required by policy to "*protect and preserve significant cultural resources and ensure that they are available for appropriate uses by present and future generations*" (BLM IB 2002-101). To achieve this effort, the BLM planning manual *(BLM Manual* Section 1601) and the BLM *Cultural Resource Manual* (*BLM Manual* Section 8110) direct that each cultural resource within the *Planning Area* should be assigned to at least one of six use allocation categories. This system is based on actual or potential use of individual sites or properties. This step generally occurs as part of the planning process, and following these decisions a Cultural Resource Management Plan is prepared. Table 3-19 shows the use allocation categories and their descriptions. Table 3-20 shows the desired management outcomes, the management actions, and the sites currently assigned to each use allocation. The majority of sites

recorded in the *Planning Area* are managed for scientific use as properties that have been informally determined to be eligible for the NRHP due to their potential to yield data important in understanding the history and prehistory of the region. A small proportion of sites are determined to be ineligible to the NRHP and receive no further management protection.

TABLE 3-19
CULTURAL USE ALLOCATION CATEGORIES AND DESCRIPTIONS

USE ALLOCATION	DESCRIPTION
Scientific Use	Cultural property determined to be available for scientific or historical study using currently available research techniques or to be preserved until the research potential is realized.
Conservation For Future Use	Unique cultural properties (those that are unusually scarce, have significant data that cannot be removed with current technology, have singular historic or other importance, and can be "banked" for future scientific study).
Traditional Use	Cultural resources known to be perceived by a specified social or cultural group as important in maintaining their cultural identity, heritage, or well-being.
Public Use	Cultural property that has qualities useful for onsite interpretation or for other related educational and recreational uses by the general public.
Experimental Use	Cultural property determined to be suitable for controlled experimental study to improve management techniques.
Discharged From Management	Cultural property with no remaining identifiable use. No cultural resources may be removed from management before documentation, but many sites may be removed following the appropriate level of documentation and/or study.

TABLE 3-20
DESIGNATED CULTURAL USE ALLOCATIONS

USE ALLOCATION	DESIRED OUTCOMES	MANAGEMENT	SITES
Scientific Use	Preserved until research potential is realized	Permit appropriate research, including data recovery	Rattlesnake Hills Archeological District Jarilla Mountains Lone Butte Bruton Bead Site Los Tules Site San Diego Mountain
Conservation For Future Use	Preserved until conditions for use are met	Propose protective measures or designations	Butterfield Trail Mormon Battalion Trail
Traditional Use	Long-term preservation	Consult with tribes, determine management strategy	Alamo Mountain
Public Use	Long-term preservation, on-site interpretation	Determine permitted use	Three Rivers Petroglyph El Camino Real de Tierra Adentro National Historic Trail
Experimental Use	Protected until used	Determine nature of experiment	No allocation
Discharged From Management	No use after recordation; not preserved	Remove protective measures	No allocation

Protection of cultural resources is accomplished through administrative measures (such as closing an area to vehicle use) and physical measures (such as fencing), depending on the resource value, vulnerability, and degree of threat. Interim management emphasizes patrol and surveillance until objectives and actions are developed and implemented. Las Cruces District currently has an active program of signing cultural resource properties that are threatened with active or potential vandalism.

Actions to stabilize ruins are done on an as-needed basis and will continue, contingent on availability of funding. Stabilization may involve physical measures to control erosion or arroyo cutting or applying sterile fill to contour or protect damaged sites.

Sites that have no remaining information potential, traditional values or other identifiable use would be discharged from management for cultural resource values. Sites would be allocated to this category on a case-by-case basis after inspection and recordation in the field and after compliance with Section 106 of the NHPA. Generally, this category would be limited to small scatters of artifacts on the surface that have been thoroughly documented. Larger, more complex sites may be discharged from management if they have been destroyed by human or natural causes. Sites in this category would be recorded in the field and would remain in the cultural resource inventory.

Cultural resource surveys would continue to be conducted prior to authorization of any ground-disturbing activity or land disposal, with the possible exception of land conveyed to the State of New Mexico under an existing Memorandum of Understanding. This would be done in accordance with the National Programmatic Agreement and New Mexico protocol. In accordance with the protocol, the BLM approves and proceeds with projects that do not affect properties listed on or identified as eligible for the National Register of Historic Places without consulting with the New Mexico SHPO. The BLM submits documentation of such projects to the SHPO quarterly and also submits an annual report of the program. Affiliated American Indian tribes would be consulted for all actions that may affect their interests. The BLM would continue to fund and conduct proactive cultural resource inventories in compliance with Section 110 of the NHPA and in accordance with cultural resource goals and evolving management priorities.

The following areas in the *Decision Area* have been designated ACECs to, in part, protect and manage cultural resources:

- Alamo Mountain
- Doña Ana Mountains
- Cornudas Mountain
- Los Tules
- Organ/Franklin Mountains
- Rincon
- San Diego Mountain
- Three Rivers Petroglyph Site
- Wind Mountain

Management prescriptions for these areas to protect cultural resources include limiting vehicle use, closing to fluid-mineral leasing, excluding new rights-of-way, and closing to mineral material extraction and are described in Chapter 2.

3.3.10 PALEONTOLOGY

Paleontological resources, usually thought of as fossils, include the bones, teeth, bodily remains, traces, or imprints of plants and animals preserved in the earth through geologic time. Paleontological resources also include related geological information, such as rock types and ages. All fossils offer scientific information, but not all fossils offer noteworthy scientific information. Fossils are considered to be scientifically noteworthy if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most fossils occur in sedimentary rock formations. Although paleontologists generally can predict which formations may contain fossils and what types of fossils may be found based on the age of the formation and its depositional environment, predicting the exact location where fossils may be found is not possible. Known fossil localities that occur either on or outside of BLM-managed public land may serve as an indication of possible resources that could be found in similar rock formations and outcrops on public land.

A potential fossil yield classification system has been developed by the BLM. This system serves as a first screen for ground disturbing activities by generally identifying those areas or landscapes where activities may be most likely or less likely to occur. The system is based on the geology, topography, soils and other physical aspects of the landscape. Probable fossil yields are divided into five classes; however Class 5 is not known to occur in the *Planning Area,* except for geologic units in the Prehistoric Trackways National Monument. These classes and the management concerns by class are described in Table 3-21. Map 3-5 shows the potential fossil yield classes for the *Planning Area*.

Sierra and Otero Counties have a broad range of geologic formations within their borders. The rocks of the Precambrian include a complex of gneiss with metasedimentary and metavolcanic rocks intruded by granites that are not fossil bearing. The formations of the Early Paleozoic (limestones, sandstones, shales, and conglomerates) are widespread in southern New Mexico, and include nearly 320 million years of deposition of marine sediments with invertebrate fossils.

Overall, the area of greatest potential for significant fossil finds in Otero County is in the southern Tularosa Valley (Doña Ana Bombing Range) and in portions of the Sacramento and Capitan mountains. In Sierra County, the greatest potential for fossils is in the alluvial and terrace deposits (including the Santa Fe Group) along the Rio Grande; in portions of the Caballo, Fra Cristobal, San Andres, and Mimbres mountains; and in the Jornada del Muerto area near Elephant Butte Reservoir. Fossils found in Sierra and Otero counties are listed in Table 3-22.

TABLE 3-21
POTENTIAL FOSSIL YIELD CLASSIFCATION SYSTEM

CLASSES	MANAGEMENT CONCERN BY CLASS	OTHER RESOURCES AVAILABLE
5	Management concern for paleontological resources on Class 5 areas is high. Class 5 areas have produced important fossils and site-specific mitigation would be required. Class 5 areas are determined as more data is collected.	For known occurrences, check the NMMNHS on line database by county and verify by USGS Topographic Map. Other screening tools can be used such as DOQQs for outcrop exposure and soils maps for depth to bedrock.
4	Management concern for paleontological resources on Class 4 areas is towards management and away from unregulated access. Proposed ground-disturbing activities require on-the-ground assessment to determine whether significant paleontological resources may occur in the area of the proposed action.	For known occurrences, check the NMMNHS on line database by county and verify by USGS Topographic Map. Other screening tools can be used, DOQQs for outcrop exposure and soils maps for depth to bedrock
3	Management concern for paleontological resources on Class 3 areas may extend across the entire range. Ground disturbing activities need to be evaluated on a case-by-case basis for the need to mitigate.	For known occurrences, check the NMMNHS on line database by county and verify by USGS Topographic Map. Other screening tools can be used such as DOQQs for outcrop exposure and soils maps for depth to bedrock.
2	Management concern for paleontological resources on Class 2 areas is low. Ground disturbing activities would not likely require mitigation.	Paleontological resources may be associated with caves.
1	Management concern for paleontological resources on Class 1 areas is not required.	Paleontological resources may be associated with caves

Doña Ana County also includes a broad range of geological formations. Rocks of the early Paleozoic crop out along escarpments of the San Andres, Organ, and other mountains in southern New Mexico. A phosphatic dermal plate similar to that of a heterstracan fish has been found in the Cambrian Bliss Formation (Mack 2004). There have not been any confirmed reports of Ordovician or Silurian vertebrates in New Mexico. Generally, the early Paleozoic (pre-Mississippian) is sparsely fossiliferous.

Mississippian limestones are present in the San Andres and Organ Mountains and contain abundant, yet common, invertebrate fossils. Overall, the greatest potential for fossils in Doña Ana County is in the Camp Rice Formation (Santa Fe Group) found along the alluvial and terrace deposits of the Rio Grande, in the Permian Abo and Hueco formations, and in portions of the Robledo, San Andres, and Organ Mountains. Fossils found in Doña Ana County are listed in Table 3-22.

There are several notable paleontological resources in the *Planning Area*, particularly the Paleozoic Trackways site in the Permian Abo Formation, and the numerous discoveries in the Camp Rice Formation and Hueco Formation along the Rio Grande. BLM has developed a paleoecological resource database for the State of New Mexico that enables the review of areas and geologic formations to determine their potential fossil yield. This is an important step to afford opportunities for discovery and proper curation of paleontological resources on public land where projects may be undertaken.

In 1987, a major deposit of Paleozoic Era fossilized footprint megatrackways was discovered in the Robledo Mountains. The trackways contain footprints of numerous amphibians, reptiles, and insects (including previously unknown species), plants, and petrified wood dating back approximately 280 million years. Collectively, these trackways provide new opportunities to understand animal behaviors and environments from a time predating the dinosaurs.

The trackways discovery site and other tracksite locations in the Robledo Mountains are within the Wolfcampian red beds that are generally referred to as the Abo Tongue of the Hueco Formation. These strata along with an overlying upper member of the Hueco Formation represent a regional transition zone between marine limestones of the Hueco Formation to the south and nonmarine red beds of the Abo Formation to the North. The Paleozoic Trackways site is within the Prehistoric Trackways National Monument designated in 2009 through the Omnibus Public Land Management Act. A stand-alone management plan is being prepared for the Monument; therefore, it is not addressed in this RMP/EIS.

3.3.11 VISUAL RESOURCES

The Las Cruces District Office topography is varied and ranges from valley floor elevations of around 2,000 feet to mesas at around 5,000 feet and mountain elevations of over 8,000 feet. The broad valleys of the basin and range landscape trend generally north-south and can extend for more than 50 miles along this axis. These valleys afford panoramic vistas of the adjacent mountain ranges. Prominent geological features visible from major highways include the Organ Mountains, and White Sands.

Vegetation types range from Chihuahua Desert shrub consisting mostly of creosote, mesquite, yucca, and ocotillo to surrounding alluvial fans and transition zones of grasses with juniper and piñon situated on higher-elevation mountain slopes. Riparian vegetation is limited but when present may consist of overstories of cottonwood, willow, and screwbean mesquite, with dense understories of seepweed, New Mexico olive, and non-native tamarix. The Chihuahua Desert may be the most biologically diverse desert in the world. Major river systems include the Rio Grande, Gila, and Mimbres rivers. The Rio Grande is an important source of irrigation water for agricultural crops including pecans, chiles and onions.

TABLE 3-22 FOSSILS FOUND IN PLANNING AREA			
COUNTY	**GEOLOGIC PERIOD(S)**	**FORMATION**	**FOSSILS**
Doña Ana	Quaternary-Tertiary (Neogene	Camp Rice (Santa Fe Group)	Birds, bivalves, mammals (antelope, dogs, foxes, horses, camels, gomphotheres, leopards, mammoths, glyptodons), reptiles, plants
Doña Ana	Quaternary-Tertiary (Neogene)	Otero	Mammals (horses, camels, elephants), reptiles
Doña Ana	Cretaceous	Del Norte	Anthozoa
Doña Ana	Cretaceous	Del Rio	Bivalves
Doña Ana	Cretaceous	Gallup	Bivalves
Doña Ana	Cretaceous	Mancos Shale	Bivalves, cephalopods
Doña Ana	Cretaceous	Mesilla Valley	Anthozoa, cephalopods
Doña Ana	Cretaceous	Sarten	Bivalves, cephalopods, and other invertebrates
Doña Ana	Cretaceous	U-Bar	Bivalves
Doña Ana	Permian	Abo	Amphibians, reptiles, plants, invertebrates
Doña Ana	Permian	Hueco	Amphibians, bivalves, arthropods, plants, brachiopods, cephalopods, sponges, crinoids, echinoids, gastropods, insects, reptiles, trilobites, miscellaneous other vertebrates and invertebrates
Doña Ana	Permian	Robledo Mountains	Bivalves, brachiopods, gastropods, amphibians
Doña Ana	Permian	Shalem Colony	Brachiopods, gastropods, bivalves, bryozoa, cephalopods, crinoids
Doña Ana	Carboniferous	Panther Seep	Anthoza, bivalves, brachiopods, bryozoa, echinodermata, gastropods, trilobites, miscellaneous other invertebrates
Doña Ana	Cambrian	Bliss	Phosphatic dermal plates similar to heterostracan fish
Sierra and Otero	Quaternary-Tertiary (Neogene)	Otero	Mammals (horse, camel, mammoths), reptiles
Sierra	Tertiary (Neogene)	Palomas (Santa Fe Group)	Charaphyta, gar fish, crustaceans, mammals (dogs, horses, camels, gomphotheres, coryphodons, leopards), reptiles
Sierra	Tertiary (Paleogene)	Jordan Canyon	Mammal (merycoidodontidae)
Sierra	Tertiary (Paleogene)	Rubio Peak Formation	Brontothere
Sierra	Tertiary (Paleogene)	Love Ranch	Reptile
Sierra	Tertiary (Paleogene)	Palm Park	Mammals (horses, brontotheres, hyracodotidae, hyaenodontidae), reptiles, plants
Otero	Cretaceous	Mesa Rica Sandstone	Bivalves
Sierra	Permian	Abo	Arthropods and other insects, amphibians, reptiles, miscellaneous other vertebrates and invertebrates, conifers and other plants
Sierra	Permian	Bursum	Vertebrates
Otero	Permian-Pennsylvanian	Laborcita	Amphigastropods, bivalves, cephalopods, crustaceans, gastropods, holothuroids, mollusks, ophiuroids, pelecypods, rhizopods
Otero	Pennsylvanian	Beeman	Vertebrates
Otero	Pennsylvanian	Holden	Bivalves, cephalopods, gastropods, mollusks
Sierra and Otero	Mississippian	Lake Valley	Anthozoa, brachiopods, cephalopods, chondrichthyes, crinoids, crustaceans, echinodermata, echinoids, gastropods, holothuroids, ophiuroids, polychaeta, trilobites
Otero	Mississippian	Caballero	Acanthods, agnathas, bivalves, brachiopods, chondrichthyes, conodonts, crustaceans, osteichthyes, vertebrates
Otero	Devonian	Percha Shale	Algae, brachiopods, conodonts, placoderms, vertebrates, shark teeth
Otero	Devonian	Sly Gap	Brachiopods, chondrichthyes, crinoids, osteichthyes, placoderms
Sierra and Otero	Cambrian	Bliss	Phosphatic dermal plates similar to heterostracan fish
SOURCE: New Mexico Museum of Natural History and Science, 2005.			

Visual resource inventory classes are designated through the inventory process. They are informational in nature and provide the basis for considering visual values in the RMP process. They do not establish management direction and should not be used as a basis for constraining or encouraging surface disturbing activities. They are considered a baseline data for existing conditions. Visual resources in the Las Cruces District Office were last inventoried in May 2010, based on a process to determine visual (scenic) values at a specific point in time. There are three primary components combined to develop VRM Inventory Classes. Those components are: Scenic Quality Evaluation, Sensitivity Level Analysis

and Delineation of Distance Zones (Visual Resource Inventories are conducted according to the guidelines in the BLM Manual Handbook H-8410-1 Visual Resource Inventory). The results of the 2010 Visual Resource Inventory are presented in Table 3-23.

TABLE 3-23
VISUAL RESOURCES INVENTORY CLASSES ON BLM

CLASS	ACREAGE	PERCENT BLM
Class I	0	0
Class II	706,111	25%
Class III	1,028,709	36%
Class IV	1,085,332	38%

Visual resource management classes are assigned for all BLM-administered land through the RMP process. The assignment of visual management classes is ultimately based on the decisions made in RMPs, which must take into consideration the value of visual resources. There are four visual resource management (VRM) classes. The visual resource inventory process and the management objectives for each class are based on criteria identified within BLM's *Visual Resource Inventory Handbook* (1984b). Dominant landforms with unique features have been designated as VRM Class I. This includes ACECs designated to protect scenic values. The following scenic ACECs are managed as VRM Class I:

- Alamo Mountain
- Cornudas Mountain
- Wind Mountain
- Sacramento Escarpment
- Organ/Franklin Mountains
- Doña Ana Mountains
- Robledo Mountains

All of the WSAs in the *Planning Area* are designated and managed as VRM Class I. The majority of the public land within the *Planning Area* is designated as VRM Class IV landscape interspersed with Class III landscapes located near roadways, with open and panoramic scenic views. Table 3-24 summarizes how much public land is within each VRM class. The 1993 Mimbres RMP determined that the WSAs in the Mimbres Resource Area would be managed as VRM Class II until such time as they were designated wilderness by Congress or dropped from wilderness study. However, Instruction Memorandum 2000-096, *Use of Visual Resource Management Class I Designation in Wilderness Study Areas* directed that all WSAs are to be managed as VRM Class I. This is the current management direction for VRM management of WSAs in the *Planning Area*; however, to be consistent with discussion of current management of other resources in this document, the tables and maps showing the VRM/WSA information reflects the Mimbres RMP decision.

TABLE 3-24
ACRES OF PUBLIC LAND WITHIN EACH VISUAL RESOURCE MANAGEMENT CLASS

	SIERRA COUNTY	OTERO COUNTY	DOÑA ANA COUNTY	TOTAL
MANAGEMENT CLASS	ACRES	ACRES	ACRES	ACRES
Class I	0	10,000	33,000	43,000
Class II	160,581	107,153	310,610	578,344
Class III	183,714	65,420	591,502	840,636
Class IV	435,585	750,071	189,457	1,375,113

3.3.12 FIRE AND FUELS MANAGEMENT

The nature of fire in ecosystems typically is discussed in terms of fire regime, which is the combination of fire frequency, predictability, periodicity, intensity, seasonality, and extent characteristic of fire in an ecosystem. Fire regimes may be based on the characteristics of the fire itself or on the effects produced by the fire (Agee 1993). The 2001 Federal Fire Policy references preliminary Fire Regime Condition Class (FRCC) data as a way of assigning risk to ecosystem sustainability and assessing the risk of uncharacteristic wildland fire behavior and effects (Schmidt et al. 2002). These are qualitative measures that incorporate the concept of historical fire regimes as a baseline against which current conditions are compared.

3.3.12.1 Fire Regimes

To understand the role of fire in ecosystems, it is first necessary to understand how fire regimes have altered over time and geographic area. Historical fire regimes may be thought of as a backdrop against which current FRCC can be considered. Restoration of historical fire regimes may or may not be a goal within a particular area due to social and political constraints. However, by delineating FRCCs within the context of historical fire regime, land managers may be able to predict fire extent, severity, intensity, and effects more accurately. Based on the historical fire regimes and on-the-ground conditions, BLM has assigned land within the *Planning Area* into the three FRCCs as shown in Table 3-25 (USDI BLM 2004b).

TABLE 3-25
FIRE REGIME CURRENT CONDITION CLASSES

CLASS	ATTRIBUTES	EXAMPLE MANAGEMENT OPTIONS
1	Fire regimes are within or near a historical range. The risk of losing ecosystem components is low. Fire frequencies have departed from historical frequencies by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. These result in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been moderately altered from their historical range.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
3	Fire regimes have been significantly altered from their historical range. The risk of losing ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. These result in dramatic changes to one or more of the following: fire size, frequency, intensity and severity, or landscape patterns. Vegetation attributes have been significantly altered from their historical range.	Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

According to Landfire FRCC data, approximately one-third of the public land in all three counties is FRCC 3 which is highly departed from historical conditions, another third is FRCC 2 which is moderately departed, and the last third is FRCC 1 and is close to historical conditions (see Map 3-6). The result is moderate changes in fire size, intensity, severity or landscape patterns. This has resulted in vegetation such as desert shrubs dominating former grasslands, and piñon and juniper invading grass-shrublands.

Land managers have recognized fire as a natural disturbance that plays a significant role in a healthy ecosystem, and that there is a need to reintroduce fire into the landscape. The FRCC system is useful in determining an ecosystem's degree of departure from its historical fire regime and range of variability in terms of fire. Fire management units (FMUs) are predetermined areas that have similar fuels, topography, management objectives, and resource needs that allow each area to be managed as a unit. In terms of fire management, FMUs are important planning categorizations that allow management to determine how to respond to wildfire in a given area and where to focus fire suppression resources in case of multiple ignitions. Public land in New Mexico is assigned to one of four FMU categories as described in Table 3-26. These FMU categories are shown on Map 3-6.

TABLE 3-26
CATEGORY OVERVIEW OF APPROVED FIRE MANAGEMENT UNITS

FIRE MANAGEMENT UNIT CATEGORY		WILDLAND FIRE MANAGEMENT			VEGETATION TREATMENTS	
		Suppression Priority	**Suppression Strategy**	**Wildfire for Resource Benefit Allowed**	**Prescribed Fire**	**Mechanical/Chemical /Biological**
A	Full suppression areas: fire is not desired at all	High	Use an aggressive strategy and suppress fires to limit acreage burned.	No	No, except for pile burning of mechanically removed vegetation.	Yes, fuel hazard reduction to mitigate risks is a priority.
B	Fire use following mitigation: unplanned wildland fire is not desired.	High	Limit acreage burned, weighing suppression costs against potential damage from fire.	No	Yes, fuel hazard reduction to mitigate risks is a priority.	Yes, fuel hazard reduction to mitigate risks is a priority.
C	Fire use as opportunities arise: wildland fire is desired, with consideration of significant constraints.	Moderate	Use least costly suppression tactics where fire is not damaging resources.	Yes, under very limited prescribed conditions	Yes, used to attain desirable resource conditions.	Yes, used to attain desirable resource conditions.
D	Fire use emphasis are: wildland fire is desired, but with fewer constraints.	Low	Use least cost suppression tactics. Consider wildland fire use if appropriate.	Yes, under prescribed conditions	Yes, used to attain desirable resource conditions; fuel hazard reduction has a lower priority than for FMU Category C.	Yes, used to attain desirable resource conditions; fuel hazard reduction has a lower priority than for FMU Category C.

3.3.12.2 Wildland Fire Management Strategies

Within the defined FMUs, the BLM has developed specific strategies to meet public safety and resource objectives. For example, fires within ACECs and WSAs may not pose a threat to public safety if allowed to burn. However, the resource values associated with ACECs and WSAs may necessitate a high fire-suppression priority; therefore, these areas may be assigned to FMU Category A. Wildfire for Resource Benefit is the management of wildland fires to accomplish specifically stated resource management goals in defined geographic areas. For example, if a lightning strike ignites a fire in an area slated for prescribed fire in the following year, appropriate management response may include wildfire for resource

benefit as a tactic, as long as the intensity of the burn would not harm the soil, air, or other natural or cultural resource (see Table 3-27).

3.3.12.3 Wildland-Urban Interface Areas

By definition, any area where vegetative fuels and human development meet and intermingle is termed wildland-urban interface (WUI). Any residential or commercial developments, powerlines, communication sites, and pipelines that are adjacent to wildland in the *Planning Area* are termed WUI areas. These are high-priority suppression areas due to public safety concerns. The WUI areas in the *Planning Area* are full suppression areas. The community of Timberon also is listed on the *Federal Register* as a "*community at risk*" from wildfire. The National Fire Plan directs funding to identified communities for projects designed to reduce the WUI fire danger.

TABLE 3-27
DESCRIPTION OF WILDLAND FIRE MANAGEMENT STRATEGIES BY FIRE MANAGEMENT UNIT

FIRE MANAGEMENT UNIT	SUPPRESSION PRIORITY	RESOURCE BENEFIT	FUELS TREATMENT	COMMUNITY ASSISTANCE/ PROTECTION	COUNTY
A1. Three Rivers Recreation Site and Three Rivers Petroglyph ACEC	High	Low	Medium	Low	Otero
A2. Timberon	High	Low	High	High	Otero
A3. Caballo Mountain Communication Site	High	Low	Medium	Low	Sierra
A4. Aguirre Spring Recreation Site	High	Low	Medium	Low	Doña Ana
A5. La Cueva Recreation Site	High	Low	Medium	Low	Doña Ana
A6. Cox Visitor Center	High	Low	Low	Low	Doña Ana
A7. Dripping Springs Recreation Site	High	Low	Medium	Low	Doña Ana
A8. Talavera Subdivision	High	Low	Low	High	Doña Ana
A9. Lake Valley	High	Low	Low	High	Sierra
B1. Sacramento Escarpment WSA/ACEC	Medium	Low	Low	Low	Otero
B3. Hillsboro	Medium	Low	Medium	High	Sierra
B4. Rio Grande Corridor	Medium	Low	Low	Medium	Doña Ana
B5. Chaparral Community	Medium	Low	Medium	High	Doña Ana
B6. Winston/Ladder Ranch	Medium	Medium	Low	Low	Sierra
C1. Tularosa Basin/Otero Mesa	Medium	Low	Medium	Medium	Otero
C2. Franklin Mountains	Medium	Medium	Low	Low	Doña Ana
C3. Rio Grande Valley Uplands	Low	Medium	Medium	Medium	Sierra
D1. McGregor Range	Low	High	Low	Low	Otero
D2. Brokeoff Mountain WSA	Low	High	Low	Low	Otero
D3. Organ Mountains WSA/ACEC	Low	High	Low	Low	Doña Ana
D4. Robledo Mountains WSA/ACEC	Low	High	Low	Low	Doña Ana
D5. West Potrillos WSA/ACEC	Low	High	Medium	Low	Doña Ana/Luna
D6. Las Uvas WSA/ACEC	Low	High	Medium	Low	Doña Ana

3.4 RESOURCE USE

3.4.1 LIVESTOCK GRAZING

Ranchers throughout the region have been authorized to use BLM-managed land to support livestock grazing operations. Allotments may be composed of a mix of Federal, State trust, and private lands, although BLM has the authority to permit grazing on public land only. Livestock grazing programs on public land are currently authorized by the *FLPMA*, the *Public Rangelands Improvement Act of 1978*, and the *Taylor Grazing Act of 1934*. Livestock grazing on public land in the *Planning Area* is managed under the 1986 *White Sands RMP*, 1993 *Mimbres RMP*, and the *Record of Decision for the New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management* (*New Mexico Standards and Guidelines*) (2001).

The BLM uses monitoring studies and rangeland health assessments to determine if proper grazing management will meet public land health standards as outlined in the *New Mexico Standards and Guidelines*. These guidelines describe the most beneficial approach to adjusting grazing management when it is determined that livestock grazing is preventing the range from meeting the health standards. Appendix B provides an expanded description of the *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing*.

The BLM assigns each grazing allotment a grazing management category (see Appendix E) to help identify those areas most in need of improvement and to resolve potential resource use conflicts. Where necessary, allotment management plans (AMPs) or cooperative management plans are developed to address the specific issues and conflicts. The AMP outlines specific goals and objectives consistent with the RMP. In addition, the AMP outlines a grazing system along with specific rangeland improvements that may be necessary to meet the goals and objectives. The BLM has completed AMPs for 42 allotments within the *Planning Area*.

3.4.1.1 Livestock Use of Grazing Allotments

Grazing allotments in the *Planning Area* can contain public land, State trust land, and privately held or managed land. Within these allotments, parcels of land may exist that are not owned or controlled by the public land grazing permittee and may or may not be used for grazing. The BLM-administered land and State trust land parcels may or may not be separated by fencing from each other or from private land used for grazing. There have been 597 total allotments issued by the BLM Las Cruces District Office, of which 378 are grazing permits issued under Section 3 of the Taylor Grazing Act and 193 authorized by leases under Section 15 of the Taylor Grazing Act. The BLM grazing permits are tied to a base property to which the BLM has attached "*preference*" for a grazing permit. The base property must be controlled by the permit applicant. Preference includes active use and suspended use. Active use is that portion of the grazing preference that is available for livestock grazing use based on livestock carrying capacity and resource conditions in an allotment and not in suspension. Total preference may be reduced after monitoring indicates that livestock are the cause of the allotment not meeting the Standard for Public Land Health as described in Appendix B. The total preference for the *Decision Area* is 382,316 AUMs (both active and suspended AUMs).

A total of 300 allotments are located partially or entirely within the *Planning Area*; the boundaries of 7 overlap both Sierra and Doña Ana Counties. The administration of allotments that overlap the *Planning Area*'s north and east boundaries are governed by existing mutual agreements or Memoranda of Understanding with the Albuquerque and Pecos BLM District Offices. Those allotments listed in Appendix E are administered under this Plan. For all other allotments with public land within the

Planning Area, the grazing is administered by those adjacent District's land use plans. The BLM authorizes livestock grazing on public land and other Federal land (e.g., BLM collects fees for the Bureau of Reclamation and administers grazing for the International Boundary and Water Commission) on 555,000 acres within Sierra County; 856,000 acres within Otero County; and 1,083,000 acres within Doña Ana County (See Map 3-7).

Livestock use is generally measured in animal unit months (AUMs). An AUM is the amount of forage needed to sustain one animal unit (e.g., a 1,000-pound cow and calf, five sheep, or five goats) for one month (USDOI BLM 2000). Table 3-28 shows the AUMs billed and paid for in the *Decision Area* from 1991 to 2010. Billed AUMs may be less than permitted AUMs (AUMs authorized by the permit or lease), and may be more than actually used. Permittees submit their planned grazing use prior to the beginning of the grazing year (March 1) and are billed for that amount. This use may be less than the active use for their allotment. Also, the permittee, because of lack of rainfall and forage growth or economic reasons, may reduce the number of livestock on the allotment during the year, thereby reducing the number of AUMs of use. The permittee can ask for an adjustment in his or her billing, but sometimes they do not. Hence, the billed use can be more than the actual use.

TABLE 3-28
BILLED AUMS WITHIN THE TRICOUNTY PLANNING AREA, 1991 TO 2010

YEAR	BILLED AUMS FOR DOÑA ANA COUNTY	BILLED AUMS FOR OTERO COUNTY	BILLED AUMS FOR SIERRA COUNTY	TOTAL AUMS BILLED
1991	137,402	200,801	157,497	495,700
1992	146,575	203,412	159,367	509,354
1993	137,745	195,494	168,852	502,091
1994	128,545	201,110	176,836	506,491
1995	109,341	168,159	165,115	442,615
1996	115,585	176,023	169,371	460,979
1997	124,302	190,593	174,661	489,556
1998	139,036	191,972	174,681	505,689
1999	141,114	207,816	177,262	526,192
2000	122,093	186,666	162,195	470,954
2001	118,394	156,945	164,216	439,555
2002	107,462	114,160	153,783	375,405
2003	93,483	114,236	137,649	345,368
2004	79,288	98,764	110,347	288,399
2005	87,996	128,640	105,914	322,550
2006	87,675	133,626	122,469	343,770
2007	98,153	151,283	138,064	387,500
2008	101,633	153,614	146,972	402,219
2009	104,212	153,199	143,124	400,535
2010	101,807	142,133	133,449	377,389

3.4.1.2 Rangeland Utilization and Condition

Allowable livestock use on individual allotments depends on range production and the overall balance with management of other resources. Range production is the amount of actual forage a site can produce per year (Holechek et al. 2001). To sustain grazing, consumption levels must be at rates equal to or less than the rate of production, allowing existing vegetation to reproduce and reestablish (Barbour et al. 1999). Utilization is defined as the degree of forage (grass, forbs, and shrubs) removed from rangelands by grazing animals, both domestic and wild. Livestock grazing in Sierra, Otero, and Doña Ana Counties

is currently monitored to allow for an average of 40 to 60 percent utilization of most key forage species per year by domestic livestock (USDOI BLM 1993, 1986a).

Public land health assessments have been completed in portions of the Lower Rio Grande, Jornada, Tularosa, and Salt watersheds. These assessments are done in compliance with the *New Mexico Standards and Guidelines* (BLM 2000) to determine the current condition of land health within an allotment and the need or extent of use adjustments (duration, season, etc.) required to achieve sustainable levels of land health. Currently, the analyses of these assessments and existing data are in progress. Therefore, final conclusions about public land health in the *Planning Area* are not available.

A preliminary look at the existing vegetative data suggests, of the 2.8 million surface acres of public land within the *Planning Area*, approximately 1 million acres are within allotments with multiple years (ranging from 1982 to 2007) of data collected from monitoring studies. Allotments in the "I" category contain approximately 75 percent of the 1 million acres. A comparison of condition class and basal cover was completed on data collected from 180 sites. A site was assumed to have changed if the difference between the first year and the last year was greater than 7 percentage points for condition class and 10 percentage points for basal cover. This assumption compensates for the inherent variability in climatic changes and collector error. The results indicate condition class remained unchanged or improved on 69 percent of the studies. Basal cover remained unchanged or improved on 85 percent of the studies. Within the *Planning Area*, decisions based on the Analysis, Interpretation and Evaluations (AIEs) of some of these data resulted in a net reduction of 3,150 AUMs. On specific allotments decisions reduced authorized grazing use levels by 25 percent.

3.4.2 COMPREHENSIVE TRAILS AND TRAVEL MANAGEMENT

This section addresses transportation and access in the *Planning Area* for motorized surface travel. Road networks within the *Planning Area* comprise a series of Federal and State highways, county roads, BLM-maintained roads, and two-track roads. The use of these travel routes is an integral part of public land management, as these roads are used for both recreational and nonrecreational purposes. The following sections describe the current travel and transportation system within Sierra, Otero, and Doña Ana Counties in terms of the existing route network, and OHV area designation.

Within the *Planning Area*, routes, State and county roads, railroads, and airports provide access to the general area and public land. Most Federal, State, and county roads that continue through the *Planning Area* are regularly maintained; however, unimproved routes also extend from this main route network.

The majority of OHV use on public land occurs on unpaved roads and two-track roads. For management purposes, 43 CFR 8340 defines an OHV as *"any motorized vehicle capable of or designated for, travel on or immediately over land, water, or other terrain."* There has been a change in the terminology used regarding off-highway travel due to the differences in the definitions. Off-road vehicles (ORV), according to 43 CFR 8340.0-05, are "*vehicles capable of or designed to be driven off roads*", while the term OHV is meant to describe "*motor vehicles that are used off artificially surfaced roads or trails*." Within this document, the term OHV is used throughout to encompass both OHVs and off-road vehicles.

3.4.2.1 Existing Route Network

BLM's Technical Reference 9113-1, *Planning and Conducting Route Inventories*, provides three definitions of travel routes:

> **Primitive road:** A type of transportation-related linear feature that is used by four-wheel drive or high-clearance vehicles. Primitive roads do not customarily meet any Bureau road design standards.
>
> **Road:** A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.
>
> **Trail:** A linear route managed for human-powered, stock, or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

In Sierra and Otero Counties, the existing routes, approximately 7,826 miles, are located on BLM-administered land; 3,949 miles on State trust land; and 6,065 miles on county or private lands. Primary routes that extend through Otero County include U.S. Highways 54, 82, and 70. The primary route that continues through Sierra County is Interstate 25. Various state routes pass through Sierra and Otero counties, connecting to cities outside the *Planning Area*.

In Doña Ana County, existing routes consist of approximately 3,432 miles located on BLM-administered land; 2,375 miles on State trust land; and 3,303 miles on other land.

Primary routes that extend through Doña Ana County include Interstates 25 and 10; U.S. Highways 70 and 80; and State Highways 185, 28, and 26. Interstate 10 extends through Doña Ana County, linking the City of Las Cruces to the El Paso, Texas metropolitan area (located outside the *Planning Area*) and providing the primary access into New Mexico from Texas and across the International border with Mexico. Various state routes and county routes pass through Doña Ana County, connecting cities inside and outside the *Planning Area*.

3.4.2.2 Existing OHV Use Designations

OHV use designations from the *White Sands RMP* for Sierra and Otero Counties are shown on Map 2-10. Table 3-29 shows approximate acreages for the OHV use designations on public land within the *Decision Area* for Sierra and Otero Counties. The majority of the public land in Sierra and Otero Counties is designated as "*open"* to OHV use. The *White Sands RMP* was developed in the mid-1980s when standard practice was to leave OHV use on public land unrestricted; limitation of use was considered inherent based on the difficulties of access posed by the natural environment (e.g., desert vegetation and terrain).

OHV use on most BLM-administered land in Doña Ana County is "*limited"* to existing roads and trails; however, the Aden Hills area is open for OHV use. Three areas are designated as closed to OHV use in Doña Ana County: the 20-acre Los Tules ACEC, designated to protect cultural resources; an 8,800-acre scenic portion of the Organ/Franklin Mountains ACEC; and Alamo Mountain ACEC. The OHV designations for Doña Ana County are shown on Map 2-10, and Table 3-29 provides approximate acreages of the *Decision Area* OHV use designations within Doña Ana County.

In accordance with the BLM *Land Use Planning Handbook* (BLM 2005a) requirements and 43 CFR 8340, all public land must be designated as "*open*," "*limited*," or "*closed*" to motorized vehicle use.

These designations establish guidelines and limitations for OHV use and although cross-country OHV use is permitted in areas designated as "*open*," undue and unnecessary degradation of resources is not permitted on any area of public land. The BLM's OHV area designations are defined as follows:

- **Open:** BLM designates areas as *"open"* for intensive OHV use where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.

- **Limited:** The *"limited"* designation is used where vehicular use must be restricted to meet specific resource management objectives. Limitations may include placing restrictions on the number or type of vehicles, limiting the time or season of use, allowing only permitted or licensed use, limiting the use to existing roads and trails, and limiting use to designated roads and trails.

- **Closed:** BLM designates *"closed"* areas as necessary to protect resources, ensure visitor safety, or reduce user conflicts.

Improvements in OHV technology including the type, size, and power of these vehicles and the growing popularity of using them on public land has required BLM to shift its policy away from designating or retaining large areas open to unregulated cross-county travel. Current policy emphasizes limiting open areas to a size that can be effectively managed, that can be geographically identified, and that provides a quality OHV opportunity for participants. Expansive "*open*" areas for cross-country travel are no longer considered in BLM land use or travel management planning unless there is an identified user need or demand.

TABLE 3-29
DECISION AREA OHV USE DESIGNATIONS BY COUNTY

COUNTY	DESIGNATION	ACRES OF PUBLIC LAND	PERCENTAGE (%)
SIERRA	Open	775,076	99.0
	Limited to existing routes	871	0
	Limited to designated routes	4,097	1.0
	Closed	0	0
OTERO	Open	852,567	91.4
	Limited to existing routes	57,804	6.2
	Limited to designated routes	17,523	2.0
	Closed	0	0
DOÑA ANA	Open	8,055	0.7
	Limited to existing routes	819,960	73.1
	Limited to designated routes	254,401	22.3
	Closed	42,953	3.8

3.4.3 RECREATION AND VISITOR SERVICES

3.4.3.1 Recreation Opportunities in the Planning Area

The *TriCounty Planning Area* offers a wide variety of recreational opportunities in diverse natural settings, including the Rio Grande, mountain ranges, lakes, sand dunes, and forests. Public recreational opportunities located in south-central New Mexico occur on land managed by the Forest Service, BLM, Mescalero Apache Tribe, NMDGF, New Mexico State Land Office, and counties and cities. Recreation activities within the *Planning Area* include hiking, sightseeing, fishing, boating, scenic driving, wildlife viewing, hunting, horseback riding, mountain biking, caving, picnicking, camping, and OHV use.

3.4.3.2 Recreation Opportunities in the Decision Area

Within BLM's *Decision Area*, developed recreation is centralized in recreation sites and trails, campgrounds, and picnic areas. Dispersed recreation (e.g., hunting, camping, etc.) occurs over large areas, encompassing most of the land, independent of developed facilities (USDOI BLM 1993). Except for special designations, all areas that are not managed specifically to maintain recreational values are, by default, part of the extensive recreation management area (ERMA). The ERMA is open to dispersed recreational activities and is generally managed to limit use conflicts and resource damage. Two of the more popular dispersed activities are OHV use and hunting.

In 2004, a study of visitors to BLM land was conducted by the University of Idaho to determine how satisfied they were with their experiences on public land. One of the 18 study sites was under the jurisdiction of the BLM Las Cruces District Office. The most commonly listed recreational activities at the selected study sites included camping, sightseeing, and hiking. Overall, day trips accounted for 51 percent of all visits to public land. Approximately 63 percent of visitors indicated a preference for more educational and interpretive material about the area (University of Idaho 2004). Subsequently, Visitor Surveys have been conducted by University of Idaho for Three Rivers Petroglyph Site (2010) and Aguirre Spring Campground (2011). Both of these surveys reconfirmed the previous survey data.

Comments provided during the scoping period for the *TriCounty RMP/EIS* indicate that a wide variety of activities take place on public land in the *Planning Area*, including nonmotorized activities such as hiking, bird watching, wildlife viewing, horseback riding, and visits to areas that provide solitude, as well as motorized activities. A majority of commenters expressed their appreciation for the existing recreational opportunities on public land and a desire for more recreational opportunities.

The following sections describe OHV use, hunting, developed recreation sites, nonmotorized trails, special recreation management areas (SRMAs), and special recreation permits (SRPs) within Sierra, Otero, and Doña Ana Counties.

3.4.3.2.1 Sierra and Otero Counties

OHV Use: OHVs are used throughout the *Planning Area* for recreation (e.g., motorcycle racing and hill climbing) and for transportation to recreation sites (for example, to hunting sites). Some areas on public land, however, are completely or partially unavailable for OHV use. Land can be designated as open to OHV use, closed to OHV use, or open to OHV use with restrictions (where use is limited to existing roads and trails). Temporal restrictions also apply (for example, OHV use may not be allowed in some areas during certain seasons).

A popular OHV use area is known as Red Sands, an approximately 10-by-10-mile area on the west side of U.S. Highway 54, midway between Alamogordo and Orogrande. No specific use numbers are available, but the area can be heavily used on weekends. In addition, an annual motorcycle endurance race held in February, the Tarantula 100, normally draws 150 to 200 contestants from several states to the site (BLM 2003a).

Hunting: Most hunting in Sierra and Otero counties is for small game and birds (waterfowl and upland game species) such as ducks, geese, dove, and quail, but big game hunting for deer, antelope, and oryx also takes place within BLM's *Decision Area*. NMDGF divides New Mexico into Game Management Units (GMUs) to manage big game hunting within the state. The following are located in Sierra and Otero counties: GMUs 16b, 16c, 17, 19, 20, 21a, 21b, 28, and 29. Some units extend beyond the *Planning Area*. The primary big game species within these units include elk, deer, antelope, javelina,

barbary sheep, oryx, bear, cougar, and turkey. Other species hunted within the GMUs include raccoon, badger, weasel, fox, ringtail, bobcat, muskrats, beaver, nutria, coyote, and skunk.

Developed Recreation Sites: Developed recreation sites in BLM's *Decision Area* in Sierra and Otero counties are limited to the Three Rivers Petroglyph ACEC and the Lake Valley BackCountry Byway. Various nonmotorized trails throughout BLM's *Decision Area* accommodate recreational activities such as hiking, biking, and horseback riding, among others**.**

The Three Rivers Petroglyph ACEC is located 17 miles north of Tularosa in Otero County. The site, which includes rock art and a Jornada Mogollon pit house village, was made a recreation area in 1962. Facilities include a gravel parking lot, picnic shelters, a group area, recreational vehicle sites, restroom, and interpretive trails through the petroglyphs and the pit house village (USDOI BLM 1997a). Visitation to the Three Rivers Petroglyph site is shown in Table 3-30.

The Lake Valley BackCountry Byway is a paved, 48-mile-long two-lane highway that originates in southwestern Sierra County about 18 miles south of Truth or Consequences on Interstate 25. The scenic Byway follows State Routes 152 and 27, providing views of the historical mining towns of Hillsboro and Lake Valley, riparian habitats, and several mountain ranges (USDOI BLM n.d.). The Lake Valley Historic Townsite, located along the route, is open daily for visitation; the Lake Valley Schoolhouse has been restored to contain many of its original artifacts and furniture (USDOI BLM 2003a). The Byway also provides opportunities to view wildlife such as mule deer, antelope, quail, roadrunners, and red-tailed hawks.

TABLE 3-30
VISITOR USE DATA FOR THREE RIVERS PETROGLYPH SITE

Fiscal Year	Visitors
2000	22,223
2001	20,238
2002	18,663
2003	18,511
2004	18,824
2005	N/A
2006	18,097
2007	18,433
2008	16,642
2009	17,889
2010	15,400
2011	15,296

3.4.3.2.2 Doña Ana County

Doña Ana County affords recreational opportunities either at developed recreation sites or at sites dispersed throughout natural, undeveloped areas where visitors can enjoy activities such as wildlife viewing, sightseeing, rockhounding, rock climbing, horseback riding, hiking, and primitive camping. OHV use and hunting are among the most popular activities in the "*dispersed*" recreation category. According to the 1993 *Mimbres RMP*, public land provides 47 percent of the opportunities for dispersed recreation in the county.

OHV Use: OHV use is most prominent near populated cities, and most OHV use within Doña Ana County occurs near Las Cruces. The southern Robledo Mountains have a system of moderate-to-extreme

four-wheel drive (rock crawling) routes adjacent to Las Cruces. These trails are used for the annual Chile Challenge event. Although OHV use in the area is limited to existing roads and trails, increased OHV use in the vicinity of Las Cruces, Hatch, and the Mesilla Valley has resulted in a growing network of all-terrain and other vehicle trails. Unauthorized use of motorized vehicles has damaged resources.

Hunting: Hunting within Doña Ana County is largely for small game and birds (waterfowl and upland game species) such as ducks, geese, doves, and quail. Section 3.3.7.2 lists the most common upland species hunted and harvested, based on small game harvest surveys provided by the NMDGF. NMDGF GMUs 19, 20, 21b, and 25 are located within Doña Ana County. Some of the GMUs extend beyond the *Planning Area*. Primary game species hunted within the GMUs of Doña Ana County include deer, antelope, javelina, and cougar. Other species hunted within the GMUs may include raccoon, badger, weasel, fox, ringtail, bobcat, muskrat, beaver, nutria, coyote, and skunk.

Developed Recreation Sites: Recreation in developed sites within Doña Ana County includes Tortugas Mountain Recreation Area, Picacho Peak Recreation Area, Aguirre Spring Campground and Dripping Springs Natural Area. The latter two are within the Organ Mountains Special Recreation Management Area (SRMA). In addition, various nonmotorized trails exist throughout the BLM's *Decision Area* for hiking, biking, horseback riding, and other recreation activities.

The Aguirre Spring Recreation Area, located east of Las Cruces in the Organ Mountains SRMA, has 55 camping/picnicking areas and two group sites. The 3,000-acre Dripping Springs Natural Area is managed by the BLM. The area features sheer canyons with permanent water sources and biologically diverse natural habitats (The Nature Conservancy 2004). Dripping Springs is a day-use area; it contains a visitor center, 12 picnic sites, and 4 miles of trails that are part of the National Recreation Trail System. Table 3-31 shows annual visitation at the two developed sites in the Organ Mountains. Hunting is not allowed in either the Aguirre Spring Recreation Area or Dripping Springs Natural Area. La Cueva Picnic Area and the A.B. Cox Visitor Center both provide access trails to the Dripping Springs Natural Area in addition to several other hiking trails in the area. The La Cueva Picnic Area includes 22 picnicking sites and one group site.

TABLE 3-31
ANNUAL VISITATION AT AGUIRRE SPRING CAMPGROUND AND DRIPPING SPRINGS NATURAL AREA, 2000-2008

	VISITORS	
YEAR	AGUIRRE SPRING	DRIPPING SPRINGS
2000	59,950	22,972
2001	54,550	22,118
2002	54,139	21,644
2003	55,294	21,260
2004	58,891	22,084
2005	55,152	21,412
2006	57,224	19,399
2007	59,300	22,047
2008	59,110	35,164
2009	61,375	21,773
2010	60,020	22,720
2011	58,506	19,464

Nonmotorized Trails: The BLM manages several nonmotorized trails in the Organ Mountains, including Bar Canyon (hiking), Pine Tree (hiking), Baylor Pass (hiking, mountain bike, equestrian), and Sierra Vista (hiking , mountain bike, equestrian). The Tortugas Mountain, Doña Ana Mountains, and Picacho Peak Trail Systems also are located in Doña Ana County and are managed by the BLM.

Special Recreation Management Areas: The Organ/Franklin Mountains SRMA and the Doña Ana Mountains SRMA provide opportunities for camping, hiking, picnicking, horseback riding, and mountain biking (see Map 2-14). The Organ/Franklin Mountains SRMA includes two developed recreation sites (Aguirre Spring Campground and the Dripping Springs Natural Area).

The Doña Ana Mountains SRMA is just north of the City of Las Cruces near the southeastern portion of the NMSU Chihuahuan Desert Rangeland Research Center. The SRMA extends beyond the Doña Ana Mountains ACEC, which is managed for protection of biological, scenic, and cultural values. Recreational activities occur across the SRMA, including the areas within the ACEC. The SRMA provides mountain biking and horseback riding opportunities on developed trails.

3.4.3.3 Special Recreation Permits

BLM issues Special Recreation Permits (SRPs) in accordance with 43 CFR 2930. Commercial, competitive, and large group activities are among the uses that are likely to require a special recreation permit. Table 3-32 shows the number of special recreation permits issued and the revenue generated from them. Income from these events benefits, but does not consistently sustain, local economies due to the short-term influx of visitors to an area.

TABLE 3-32
SPECIAL RECREATION PERMITS ISSUED BY THE LAS CRUCES DISTRICT OFFICE

FISCAL YEAR	NUMBER OF PERMITS	REVENUE GENERATED
2000	17	$7,059
2001	18	$6,152
2002	14	$5,700
2003	13	$7,232
2004	15	$6,181
2005	19	$7,717
2006	16	$8,439
2007	15	$9,300
2008	18	$10,451
2009	21	$12,000
2010	26	$12,856

SOURCE: Las Cruces District Office Recreation Files, 2011.

The BLM issues annual and multi-year SRPs for licensed guides and outfitters to conduct client-contracted big-game hunts for species including antelope, ibex, and white-tailed deer. Adjoining field offices also may issue SRPs for such activities within the *Decision Area*, so long as such permits are coordinated through the Las Cruces District Office.

Other types of SRPs which include commercial and competitive OHVs, all-terrain vehicles (ATVs), and motorcycle events at the Red Sands OHV Open Area are administered through the Las Cruces District Office. Annual events at this location include the Tarantula 100 Motorcycle Race and OHV training courses conducted by licensed contractors. Commercial or competitive SRPs also include the Horny Toad Bicycle Race, Equine Endurance Race, and the internationally known Chile Challenge Extreme Rock Crawling event in the south end of the Robledo Mountains. These activities may be permitted on an annual or multi-year basis.

SRPs for organized group and commercial tours of the petroglyph sites may also be authorized and would be administered through the Las Cruces District Office. At the prerogative of the authorized officer,

interpretative and educational tours also may be allowed by a Letter of Agreement. A Letter of Agreement is not an authorization or permit, but an acknowledgement by both applicant and the authorized officer of the activity, with stipulations attached.

3.4.3.4 Emerging Recreational Uses

Emerging recreational activities include letter boxing and geocaching. These activities involve using global positioning systems to seek out letter boxes or caches that are often hidden on public land. As yet, these games have not become a management issue in the *Planning Area*. BLM allows this activity in most locations on public land and if it is conducted with minimal impact to the environment. BLM will not authorize geocaches near cultural or historic sites or other areas with sensitive resources that might be impacted by repeated visits from public searching for the geocache itself.

Paintball, shooting opponents with soluble paint pellets, is a recreation use that occurs on *Decision Area* land; however, the BLM requires an SRP to ensure that the use does not conflict with management of the area's natural resources.

3.4.4 LANDS AND REALTY

The Las Cruces District's lands and realty program provides support to all other resources and resource uses within the *Planning Area*. The goals of the lands and realty program are to manage the public land to support the goals and objectives of other resource programs, provide for uses of public land in accordance with applicable laws and regulations while protecting sensitive resources, and improve management of the public land through land tenure adjustments. The program responds to requests for rights-of-way (ROWs), permits, leases, easements, withdrawals, and land tenure adjustments from other programs or outside entities. The frequency of such requests is anticipated to increase as neighboring communities grow and the demand for use of public land increases. As a result, future management of the lands and realty program will likely become more intense, complex and costly.

The primary responsibilities of the lands and realty program include (1) land tenure adjustments (e.g., sales, exchanges, donations, purchases); (2) withdrawals, classification and other segregations; and (3) ROWs, and other land use authorizations (e.g., leases and permits, airport leases). The following sections describe the current conditions and status of lands and realty within the *Planning Area*.

3.4.4.1 Land Tenure Adjustments

The land ownership pattern in the *Planning Area* is diverse. The BLM Las Cruces District land tenure adjustment criteria are outlined in Appendix M. The Land Tenure Adjustment criteria provide guidance and authorities used to implement actions. In managing the approximately 2.82 million acres of public land (surface estate) within the *Planning Area,* the BLM provides for land uses through purchase, exchange, lease, donation, sale, and withdrawal and determines the boundaries of Federal land. Land tenure adjustments are often associated with accommodating public and private needs, community expansion, consolidating public land, acquiring and protecting important resources, acquiring access to public land, or serving a National priority. The BLM uses several authorities to make land tenure adjustments through disposal and acquisition. The BLM's Land Tenure program is designed to:

- Improve management of natural resources through consolidation of Federal, Tribal, State trust and private lands;
- Increase recreational opportunities and secure public access to public land;
- Preserve open space and traditional landscapes;

- Secure key property necessary to protect endangered species, promote biological diversity and preserve wildlife habitat and migration corridors;
- Preserve archaeological, historical and paleontological resources;
- Implement specific acquisitions authorized by Acts of Congress; and
- Allow for expansion of communities and consolidation of non-Federal land ownership.

The 1993 *Mimbres RMP* and the 1986 *White Sands RMP* designated areas to be retained (*"retention areas"*) and to be disposed (*"disposal areas"*) to maintain land of value for particular resources or uses and for the orderly disposition of land suitable for disposal. Generally, retention areas are relatively concentrated blocks of public land that include scattered or isolated parcels of State trust land, private land or special designations such as WSAs and ACECs. Disposal areas meet the criteria defined in FLPMA which are "*tracts of public land that are difficult and uneconomic to manage, or parcels that could serve important public objectives including, but not limited to, expansion of communities, economic development, and as a result of Federal legislation*". Disposal actions are usually in response to public request or application that results in a title transfer, wherein the lands leave the public domain. Legal descriptions of lands identified for disposal are listed in Appendix M.

Since the completion of the *Mimbres RMP* in 1993, two disposal actions have occurred in Doña Ana County that required the *Mimbres RMP* to be amended since the disposals were not in conformance with the land use plan:

- RMP Amendment for the Land Ownership and Boundary Adjustment, Organ/Franklin Mountains ACEC (1999) – direct sale of 320 acres within the Organ/Franklin Mountains ACEC to Our Lady's Youth Center of El Paso, Texas.

- RMP Amendment for the Santa Teresa Land Exchange (2008) – disposing of 7,352 acres of Federal land in Doña Ana County to the New Mexico State Land Office in exchange for 12,786 acres of State trust land (3,426 acres in Doña Ana County and 9,360 acres in Chaves County).

3.4.4.1.1 Land Exchanges

Exchange is the process of trading lands or interest in lands. Public land may be exchanged for lands or interest in lands owned by corporations, individuals, or government entities. Exchanges are the primary means by which land acquisition and disposal are carried out. Except for those exchanges that are Congressionally-mandated or judicially required, exchanges are voluntary and discretionary transactions with willing landowners. Exchanges serve as a viable tool for the BLM to accomplish its goals and mission regarding land and resource management. The land to be exchanged must be approximately equal monetary value and located within the same state. Exchanges also must be in the public interest and conform to applicable BLM land use plans.

Land exchanges are used to (1) bring lands and interest in lands with high public resource values into public ownership; (2) consolidate land and mineral ownership patterns to achieve more efficient management of resources and BLM programs; and (3) dispose of public land parcels identified for disposal through the planning process which may be needed for community expansion or commercial development.

Six land exchanges have taken place since the 1993 *Mimbres RMP* and 1*986 White Sands RMP* were completed*:*

- BLM/State Land Exchange (Bernalillo County) – 642 acres acquired in the Petroglyph National Monument.
- Soledad Canyon Land Exchange, (Doña Ana County) – 110 acres acquired in the Soledad Canyon area of the Organ Mountains.
- Picacho Peak Land Exchange, (Doña Ana County) – 1,494 acres acquired in Picacho Peak area.
- BLM/State Exchange (Sierra County, Santa Fe County) – 561 acres acquired in the Kasha Katuwe-Tent Rocks National Monument and the Ball Ranch ACEC
- BLM/State Land Exchange (Santa Teresa) – 3,426 acres acquired in Doña Ana County and 9,340 acres in Chaves County.
- BLM/Tularosa Creek Land Exchange (Otero County) – 11.60 acres acquired in Tularosa Creek area.

3.4.4.1.2 Land Sales

Other land tenure actions which occur in the *Planning Area* include sales authorized under Section 203 of FLPMA and conveyance of mineral interest under Section 209(b) of FLPMA. Public land determined suitable for sale are offered on the initiative of the BLM unless their disposal was directed by Federal legislation. The land is sold at fair market value and meets the sale criteria of FLPMA. Specific land suitable for sale must be identified in the RMP. Public land classified, withdrawn, reserved, or otherwise identified as retention lands are not available or subject to a land sale.

Section 209 of FLPMA authorizes the conveyance of Federal minerals through sale and specifies the conditions under which the mineral rights will be conveyed. The mineral rights may be sold with the land surface, sold as a separate transaction, or retained by the United States. Conveyance of mineral rights has occurred only in conjunction with the sale of land. Other methods of sale in the *Planning Area* include sales through Color-of-Title (43 CFR 2540) (see Table 3-33). In addition, a Color-of-Title was issued and public land conveyed in October 2002 for approximately 5 acres in Otero County.

TABLE 3-33
FLPMA SALES WITHIN *PLANNING AREA*

PROPRIETOR	SALE TYPE	COUNTY	DATE	ACRES
Our Lady's Youth Center	FLPMA	Doña Ana	October 2000	320.000
Mesa Farms Coop Inc.	FLPMA - Section 203 & 209	Doña Ana	October 2006	396.340
Philippou, Philippos	FLPMA - Section 203 & 209	Doña Ana	January 2005	39.470
Synergy Gas Corp	FLPMA - Section 203 & 209	Otero	January 1996	1.060
Dugan, Charles J.	FLPMA - Section 203 & 209	Otero	May 1995	1.140
Tidwell, Fred	FLPMA - Section 203 & 209	Otero	May 1995	0.440
Atkins, S.W.	FLPMA - Section 203 & 209	Otero	June 1995	0.090
Alexander Moulding	FLPMA - Section 203 & 209	Otero	May 1995	0.060
Danley, William	FLPMA - Section 203 & 209	Otero	May 1995	0.580
TOTAL				**759.18**

SOURCE: BLM, Las Cruces District Office, Lands Records (LR2000, October 2010)

In July 2000, Congress passed legislation that authorized the Federal Land Transaction Facilitation Act (FLTFA) for 10 years. Through its *"land for land"* approach, FLTFA funded sales of scattered BLM tracts authorized for disposal under the FLPMA and the respective RMPs. The Department of the Interior and Department of Agriculture allocate FLTFA funds to acquire priority lands from willing sellers within the boundaries of designated BLM areas, National forests, National parks and National wildlife refuges.

The BLM Las Cruces District identified a total of 120,371 acres of public land for disposal through the *Mimbres RMP* and *White Sands RMP*. Approximately 47,866 acres in Doña Ana County, 34,704 acres in Otero County, and 37,801 acres in Sierra County were identified for disposal. Appendix M provides by county the legal description and acreage of public land identified for disposal that qualify for use of revenues under the FLTFA. FLTFA has expired; however, on July 27, 2010, Congress passed the emergency supplemental appropriations bill to extend FLTFA for one year. FLTFA expired again in July 2011 and has not yet been extended.

3.4.4.1.3 Purchases

The BLM has the authority, under Section 205 of FLPMA to purchase lands or interests in lands. Similar to other acquisitions, purchase is used to acquire key natural resources or to acquire legal ownership of lands that enhance the management of existing public land and resources. Acquiring lands and interests in lands including easements or access to public land through purchase helps consolidate management areas to strengthen resource protection and to facilitate public access. Purchases may be in order to enhance recreational opportunities, acquire crucial wildlife habitats or protect important cultural sites. Acquisition of land by purchase is used sparingly given the limited funds available through appropriations. These funds are allocated through the Land and Water Conservation Funds program. The BLM occasionally receives gifts or donations of lands or interest in land when an entity elects not to receive the market value for the interest being conveyed.

3.4.4.1.4 Recreation and Public Purposes Act Leases and Conveyances

The Recreation and Public Purposes (R&PP) Act authorizes BLM to lease or convey public surface to Federal, State and local governments and qualified non-profit organizations for recreational or public purposes. Lands are leased or conveyed for less than fair market value or at no cost for qualified uses. Examples of typical uses under the R&PP Act include parks, public work facilities, schools, and fire stations. Table 3-34 is a summary of R&PP conveyances within the three counties from 1993-2010.

The 1993 *Mimbres RMP* set aside several parcels of public land in Doña Ana County for potential lease and conveyance under the R&PP Act. This was a result of the Elena Gallegos Land Grant Exchange Amendment (1982) and the *Southern Rio Grande Management Framework Plan Amendment* (USDOI BLM 1986b) which had disposed of large areas of public land on the east side of Las Cruces. These set-asides were for parks and facilities by the City of Las Cruces, and school sites for future development by the Las Cruces School District. Several of the parcels have been conveyed to the City and School District for the purposes for which they were retained in Federal ownership.

3.4.4.1.5 Airport Leases

Other public land conveyed in the *Planning Area* is for airports under Section 516 of the Airport and Airway Improvement Act of September 3, 1982 (49 U.S.C. 2215). Within the *Planning Area*, three airport grants were conveyed to the Village of Hatch in March 2002 for a total of 311.910 acres and one to the City of Truth or Consequences for 35 acres in October 2005.

TABLE 3-34 RECREATION AND PUBLIC PURPOSES ACT CONVEYANCE				
R&PP		**ACRES CONVEYED BY COUNTY**		
HOLDER	**TYPE**	**DOÑA ANA**	**SIERRA**	**OTERO**
Las Cruces District #2	School Site	50.0		
Las Cruces District #2	School Site	41.9		
Gadsden District #16	School Site	15.0		
Doña Ana County	Fire Station	2.6		
Las Cruces District #2	School Site	45.6		
City of Sunland Park	Recreational Purposes	138.9		
Catholic Diocese	Recreation Purposes	67.6		
Las Cruces District #2	School Site	30.2		
Las Cruces District #2	School Site	15.1		
Otero County	Park Site			20.0
City of Alamogordo	Park Site			80.0
Otero County	Fire Station			2.5
Otero County	Fire Station			10.0
Sierra County	Fire Station		4.0	
Sierra County	Fire Station		2.5	
Sierra County	Waste Transfer Station		2.5	
City of T or C	Historic-Park Site		0.3	
TOTAL ACRES CONVEYED		406.9	9.3	112.5
SOURCE: BLM, Las Cruces District Lands Records (LR2000, October 2010).				

3.4.4.1.6 Withdrawals and Classifications

The lands withdrawal program is part of the BLM's lands and realty program as delegated by the Secretary of the Interior. A major reason for this designation is that BLM has primary jurisdiction over the mineral estate on Federal land. Withdrawals may segregate the public and National Forest System lands from some or all of the public land, mineral leasing, or the United States mining laws or transfer administrative management of the land from the BLM or the U.S. Forest Service to other Federal agencies. The withdrawal program is the only BLM program that requires the Department of the Interior approval to make, modify, revoke, and extend withdrawals (Section 204, FLPMA, 43 USC 1714 and DM 603.1).

A withdrawal is a formal action that sets aside, withholds, or reserves lands for public purposes and must be in conformance with the governing land use plan. Withdrawals accomplish one or more of the following:

- Transfers total or partial jurisdiction of Federal land between Federal agencies;
- Dedicates Federal land for a specific purpose;
- Segregates (close) Federal land from operations of some or all of the public land laws and (or) mineral laws.

All the existing withdrawals segregate from operation of the public land laws, unless the surface estate is in non-Federal ownership. As used in terms of withdrawals, the public land laws refer to the body of laws governing land disposal, such as sales and exchanges. No existing or proposed withdrawal segregates from mineral material disposal, meaning no withdrawal closes the land to permits or contracts for disposal of sand and gravel or common varieties of building materials. A withdrawal creates a title encumbrance on the land restricting an agency's ability to manage its lands under multiple-use management principles.

A total of 31 withdrawals exist within the *Planning Area* (see Table 3-35). Included in Table 3-35 are existing withdrawals established by the BLM to close specific sites and protect the existing resource values, as well as withdrawals transferring public land to other Federal agencies to accomplish their mission goals. The land use plan may make decisions recommending the continuation, revocation, or enlargement of existing BLM withdrawals and about establishing new BLM withdrawals. This land use plan may also consider transferring additional pubic land to other Federal agencies through withdrawal, where additional public land is needed to accomplish their mission goals. This Plan would not be used to make decisions or revocation of other Federal agency existing withdrawals, although this Plan does recognize that should a withdrawal be revoked by action of another Federal agency, those lands that are suitable for return to public land status for management by the BLM will be managed in the same fashion as adjoining public land.

TABLE 3-35
EXISTING WITHDRAWALS WITHIN THE *PLANNING AREA*

WITHDRAWAL TYPE	COUNTY	NUMBER	ACRES
BLM-Miscellaneous	Doña Ana	1	40.2
Bureau of Reclamation	Doña Ana	2	432.3
Dept. of Army	Doña Ana	1	1,381.8
Dept. of Air Force	Doña Ana	1	34.4
Mexican Boundary	Doña Ana	1	120.0
BLM-Special Designation	Otero	1	5,364.9
BLM-Miscellaneous	Otero	1	40.0
FS-National Forests	Otero	10	11,573.0
Dept. of Army	Otero	3	791.9
Bureau of Reclamation	Sierra	5	4,421.9
FS-National Forests	Sierra	4	4,476.7
Fed Aviation Admin	Sierra	1	100.0
TOTAL		**31**	**28,777.1**

As part of the land use planning process, Section 204(l) of FLPMA requires the review of existing withdrawals to determine if they are still serving the purposes for which they were made. If the withdrawals no longer service their intended purpose, they are to be revoked and the land opened or partially opened to the uses that were previously prohibited. If withdrawals are determined to still be meeting the purposes for which they were made, they are recommended for extension for a specific term. If it is determined by a withdrawal review that a withdrawal should be revoked or terminated, or a withdrawal expires, the land does not automatically open to operation of the public land law(s) to which

the land was closed. An opening order would be published to notify the public when and to what extent the land would be opened, consistent with planning decisions. An opening order may be incorporated in a public land order or termination order that revokes or terminates a withdrawal or may be published in the *Federal Register* as a separate document. The BLM can make recommendations to designate, revoke, or extend withdrawals, but only the Secretary has the authority to actually take these actions.

3.4.4.2 Land Use Authorizations

3.4.4.2.1 Permits, Leases, and Easements

Section 302(b) of FLPMA authorizes the BLM to issue leases, permits, and easements for the use, occupancy, and development of public land. Applicants can be state and local governments and private individuals. Leases are long-term authorizations that usually require a significant economic investment in the land. Permits are usually short-term authorizations not to exceed 3 years. Permits for commercial photography or filming are issued on a one-time basis for a specific time period and purpose.

Trespass: The BLM is responsible for realty trespass abatement, which includes prevention, detection, and resolution. Land authorizations, such as leases and permits, have typically been issued to resolve occupancy and use trespass. Trespass generally includes any unauthorized use of public land and in the case of the realty program can include unauthorized dumping which usually occurs along drainages, isolated parcels, and in areas where private land borders public land; occupancy trespass, putting a building or house on public land; and agriculture trespass, planting crops on public land.

3.4.4.3 Rights-of-Way and Corridors

3.4.4.3.1 Rights-of-Way

A ROW grant is an authorization to use a specific piece of public land for a certain project, such as developing roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. Generally, a BLM ROW is granted for a term appropriate for the life of the project. In the existing land use plans, ROW corridors were designated as the preferred location for existing and future ROWs in the *Planning Area*.

An important component of the ROW program is the intrastate and interstate transportation of commodities ultimately delivered as utility services (e.g., natural gas, electricity) to residential land and commercial customers. Equally important on the local level is the growing demand for legal access to private homes and ranches using ROW grants. It is the policy of the BLM to authorize all ROW applications at the discretion of the authorized officer in the most efficient and economical manner possible. Currently, there are total of 953 ROWs that exist within the *Planning Area* (see Table 3-36). These ROWs have been granted to various towns, cities, counties, individuals, companies, organizations, government agencies and other entities.

3.4.4.3.2 Communication Sites

Communication sites host communication equipment and facilities for various uses, such as television, radio, microwave, seismograph, cellular and internet. Within the *Planning Area*, there are a total of 71 existing ROW communication site leases authorized: 30 in Doña Ana County, 28 in Sierra County, and 13 in Otero County. The BLM authorizes communication site leases to a single or most often more than one facility or co-location within a facility or site. These sites are identified by name or local prominent landmark. There are seven established plans for communication sites in the *Planning Area* (Table 3-37). These communication site plans have not been designated as suitable for communication uses.

3.4.4.3.3 Utility Corridors, Exclusion Areas, and Avoidance Areas

In January 2009, the Department of Energy issued the Record of Decision for the *Final Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386) (USDOI 2008a). That Programmatic Environmental Impact Statement (PEIS) provided the methodology used to locate energy transport corridors in the 11 Western States and identified the corridor locations that were ultimately derived from the process. In addition, the PEIS presented the effects on the environment associated with potential future projects undertaken within the designated corridors. The PEIS identified corridors within the *Planning Area*; however, because of protests on the final PEIS, a north-south corridor for Doña Ana County was not identified. That decision was left to be determined in this *TriCounty* RMP Amendment for Mimbres Resource Area.

The BLM Las Cruces District Office manages ROWs through a system of designated corridors and designated ROW exclusion and avoidance areas. Appendix M provides further description of exclusion

TABLE 3-36 EXISTING RIGHTS-OF-WAY WITH THE *PLANNING AREA*				
RIGHT-OF-WAY TYPE	**COUNTY**			**TOTAL IN *DECISION AREA***
	DOÑA ANA	**OTERO**	**SIERRA**	
Temporary Use Permits	0	0	1	1
Roads	66	17	20	103
Roads Federal Facility	2	3	2	6
Roads Federal 44LD513	0	1	1	2
Tram & Log Road-Public Land	0	1	0	1
Fed Aid Highway (Sec 107)	2	1	1	4
Fed Aid Highway (Sec . 317)	32	11	29	72
Material Sites (Sec. 317)	13	5	1	19
Fed Aid Highway (Sec. 17)	18	13	11	42
Roads Under RS2477	0	0	1	1
Material Sites (Sec 17)	10	1	0	11
FS Federal Aid Hwy (Sec. 317)	0	1	0	1
Railroad, Station Ground	0	1	0	1
Railroad & Stations	3	1	0	4
Power Facilities	4	2	0	6
Power Transmission Lines	47	6	10	48
Power Transmission Lines-FLPMA	101	40	15	156
Power Transmission Acquisition	2	0	0	2
Power Transmission-Irrigation Project	2	1	3	5
Power Line Reconveyed	3	0	0	3
Communication Site, FLPMA	21	10	19	50
Communication Site, 1911	5	2	1	8
Communication Site, Federal Facilities	4	1	7	12
Telephone/Telegraph	18	5	2	25
Telephone/Telegraph, FLPMA	56	30	7	93
Telephone/Telegraph 44LD513	0	3	1	4
Radio & TV Sites	0	0	1	1
Telephone/Telegraph, Acquisition.	1	0	0	1
Water Facility	54	10	7	71
Water Facility Fed	2	1	0	3
Water Facility 44LD513	3	0	0	3
Irrigation Facility	8	2	2	12
Irrigation District	0	0	1	1
D/C Exercise of Right	1	0	0	1
Water Plants	7	7	3	17
Pipeline Other	14	0	0	14
O&G Pipeline	31	9	2	42
O&G Facility Sites	30	1	0	31
Other FLPMA	43	2	3	48
Misc. & Special	4	0	1	5
Other Federal Facility	5	7	2	14
Other Federal 44LD513	2	0	4	6
Forest Service Easement Grant	0	2	1	3
TOTAL	**614**	**197**	**159**	**953**
SOURCE: BLM Lands Records (LR2000, October 2010)				

TABLE 3-37 COMMUNICATION SITE PLANS WITHIN *PLANNING AREA*			
COMMUNICATION SITE NAME	**TYPE OF USE**	**COUNTY**	**SITE PLAN APPROVED**
Magdalena Peak	Joint low-power two-way radio for public health and safety uses site.[1]	Doña Ana	May 28, 2010
West Mesa	Low-power radio relay site.	Doña Ana	July 26, 2007
Tortugas "A" Mountain	Joint low-power two-way public health and safety uses and broadcast uses site[2].	Doña Ana	October 7, 2004
Twin Peaks	Joint low-power two-way radio and microwave for public health and safety uses and limited to the existing broadcast uses[3].	Doña Ana	December 17, 2007
Organ/San Augustine Pass	Low power non-broadcast radio site.[4]	Doña Ana	July 26, 2007
La Union	Low power two-way, trunked radio and localized microwave relay site. [4]	Doña Ana	September 26, 2006
OroGrande	Low-power non-broadcast radio site.	Otero	July 25, 2008

NOTES:
[1] Limited to existing broadcast uses which are not specifically operating as public health and safety uses as long as they can demonstrate they are designed, operated and maintained to protect the senior uses which are public health and safety.
[2] Limited to the existing NWS 100 watts station and the NMSU 200 Kw Digital TV station. Grandfathered are commercial Mobile Radio Service (CMRS) and Wireless Internet Service Provider (WISP) uses which are not specifically operating as public health and safety uses as long as they are designed, operated and maintained so as to protect the senior uses which are public health and safety.
[3] Limited to existing broadcast uses which are not specifically operating as public health and safety uses as long as they can demonstrate they are designed, operated and maintained to protect the senior uses which are public health and safety. Grandfathered are CMRS, Cellular, and WISP uses which are not specifically operating as public health and safety uses as long as they are designed, operated and maintained so as to protect the senior uses which are public health and safety.
[4] All uses must be designed, operated and maintained so as to protect (not to materially or electronically interfere) senior uses.

and avoidance definition and Las Cruces District policy. The Las Cruces District Office has encouraged the placement of new facilities within established corridors. Exceptions have been permitted based on the type of and need for the proposed facility and the absence of conflict with other resource values and uses. Overlapping or adjacent ROWs are issued whenever possible. Within Doña Ana County, the *Mimbres RMP* designated seven utility corridors that do not have predetermined widths, unless specified in the management prescriptions for ACECs. Because the corridors in Doña Ana County have no specified width in most areas, they are shown as lines on Map 2-22. Utility corridors were not established for public land within Sierra and Otero Counties under the *White Sands RMP*. The BLM encourages the use of designated ROW corridors, but it is not required.

Through the land use planning process, the BLM establishes ROW exclusion and avoidance areas to guide decisions about where ROWs may be granted. In exclusion areas, no ROW is allowed unless mandated by law; in avoidance areas, ROWs may be granted only when no feasible alternative route (or designated ROW corridor) is available (USDOI BLM 1993). The exclusion area acreage on public land in Sierra and Otero Counties totals 58,000 acres; the avoidance area acreage totals 1,000 acres. In Doña Ana County, the exclusion area acreage is 11,000 acres and the avoidance area acreage 216,000 acres. These areas are shown on Map 2-22.

3.4.5 RENEWABLE ENERGY

Sites for renewable energy projects are granted as ROWs under the Lands and Realty program. Applications for commercial renewable energy facilities would be processed as ROW authorizations under Title V of the FLPMA and Title 43 CFR 2800. Since 2008, the BLM Las Cruces District has received six applications for renewable energy sites including for both solar and wind energy projects. However, as of 2012 no renewable energy production facilities have been established within the *Decision*

Area. A report prepared by the US Department of Energy (DOE) in 2003 assessed the solar and wind energy potential for the *Planning Area* and found that the area has potential for development of solar and wind (see Map 3-8 and 3-9). While geothermal energy is considered a renewable energy, it is also managed as a fluid mineral. The current status of geothermal energy leasing and use is addressed in the leasable minerals section at 3.4.6.1.2. Sun Zia, a transmission line intended to transport energy generated by wind facilities in central and eastern New Mexico, would traverse through Sierra County. Two bi-directional high-voltage lines are under analysis in *the Draft Environmental Impact Statement and Resource Management Plan Amendments for the Sun Zia Southwest Transmission Project* (USDOI BLM 2012d).

3.4.5.1 Solar Energy

In October 2012, DOE and the BLM signed a Record of Decision for a Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in the Six Southwestern States. The EIS is an instrument to develop and implement Agency-specific programs and guidance to establish environmental assessment policies and mitigation strategies for solar energy projects. The EIS amends relevant BLM land use plans.

There are two types of technology considered for renewable solar energy generation: concentrating solar power (CSP) and photovoltaic (PV). CSP plants are large systems that use mirrors to focus sunlight to create high temperatures to heat fluid that is in turn used to generate steam to propel turbines as in a conventional electrical generating system. PV is a solar energy collection system consisting of flat plates of collecting cells that convert sunlight directly into electrical energy.

3.4.5.2 Wind Energy

The DOE has identified the *Planning Area* as having a small total land area for high-potential wind power density (USDOE 2003). Wind energy is a renewable energy resource that has excellent potential for generating electricity. In December 2005, BLM in cooperation with the DOE issued a Record of Decision for a programmatic EIS to implement a Wind Energy Development Program and Associated Land Use Plan Amendments on BLM land in the 11 Western States (excluding Alaska). In 2009, the BLM issued a revised policy on wind energy development on public land (Instruction Memorandum 2009-043).

There are currently no wind energy facilities in the *Planning Area*; however, the DOE and the BLM survey of topographic and historical wind conditions has identified locations in the *Planning Area* where wind resources are suitable for development. One meteorological tower to test wind resources was erected in the Goodsight Mountains just west of Doña Ana County in Luna County, in 2009. In 2011, Element Power constructed a 50-megawatt first phase of a "*wind farm*" in northeast Luna County, outside the *Decision Area*. However, Phase II is planned for southwest Sierra County a few miles north of the present project.

3.4.5.3 Biomass Energy

Biomass is material derived from trees, shrubs, plants, agricultural crops, agricultural or forestry residues, and other plant waste that can be burned or processed into fuel to produce energy. Biomass is a relatively untapped energy resource because there are few facilities to process and burn it. A report prepared by the DOE and the BLM identified the *Planning Area* as having a fair biomass potential (USDOE 2003). These data indicate that the *Decision Area* has a low potential for biomass energy production.

3.4.6 MINERALS

The three classifications of mineral estate on public land include locatable, leasable (coal, geothermal, oil and gas, other solid leasable), and salable minerals. These classifications have been defined by Federal laws, regulations, and legal decisions (BLM 1997b). Federal mineral estate (ownership) is shown on Map 3-10. The fluid minerals (oil, gas, and geothermal) are the only leasable minerals with any potential of occurrence in the *Decision Area* and thus are the only ones addressed here.

BLM is responsible for managing all acres of Federal mineral estate within the *Planning Area*, a total of 3,984,256 acres, including minerals underlying land managed by private, State, and other Federal agencies. The BLM coordinates closely with other surface owners or managers to ensure that surface resource issues are considered before Federal mineral development occurs on split-estate land.

The remainder of this section addresses known prospects, mineral occurrences, and mineralized areas; mining claims, leases, and material sites; types of mineral deposits in the area of interest; and mineral economics. Additional information is available in the *TriCounty Analysis of the Management Situation* and the 2003 *Energy and Mineral Potential Report,* on file with the BLM Las Cruces District Office.

3.4.6.1 Leasable Minerals

Table 3-38 shows the areas open, closed or otherwise restricted for oil, gas, and geothermal leasing as described in the *White Sands RMP* (USDI BLM 1986a) and the *Mimbres RMP* (USDI BLM 1993). Although areas within the District are nominated for fluid minerals leasing from time-to-time, there has been no exploration or drilling activity in the *Planning Area*, except on Otero Mesa as described below, in the last 10 years. The potential for coal development is low in the *Decision Area* (Molina et al. 1991). One mine operated in the Engle field in the period 1905-1910. There have been two other old (pre-1950) prospects in that field, neither of which was developed into a mine. The thin seams (less than 2 feet) and steep dip (about 80 degrees) along the outcrop make mining unattractive. Several wells drilled in the Engle field have intersected coal seams ranging from 2 to 4 feet at depths of 350 to 1,200 feet, too thin and deep to be of interest for commercial mining. There has been no interest in exploring or developing the coal resources in recent decades.

3.4.6.1.1 Oil and Gas

New Mexico is an important producer of extractive energy resources such as oil and gas, but the *Planning Area* is not a contributor to the State-wide industry. Exploratory wells have been drilled in the *Planning Area*, but no oil and gas production has occurred. Surface concentrations of carbon dioxide and helium detected from exploratory wells suggest that economically viable concentrations potentially exist within the *Planning Area*, but no gas production has occurred (see Map 3-11).

From the early 1920s to the present, there have been 35 exploratory wells drilled in Sierra County, 63 exploratory wells drilled in Otero County, and 17 exploratory wells drilled in Doña Ana County (New Mexico Bureau of Geology and Mineral Resources 2005; New Mexico Energy, Minerals and Natural Resources Department 2005). Exploratory wells have targeted porous sandstone and limestone formations ranging from Mississippian carbonate rocks to Cenozoic sandstones. Although there have been shows of oil and gas reported in several of those wells in each County, there have been no economic production to date.

TABLE 3-38 AREAS OPEN, CLOSED OR RESTRICTED FOR FLUID MINERAL LEASING			
AREAS	**ACRES**	**RESTRICTIONS[1]**	**AUTHORITY**
Wilderness Study Areas	261,793	Non-discretionary closure	BLM Policy
Former Military Use Areas	8,381	Non-discretionary closure	Public law
ACECS	75,020	Discretionary closure	Mimbres RMP (1993); White Sands RMP Amendment (1996)
Kilbourne Hole National Natural Landmark	5,500	Discretionary closure	Mimbres RMP (1993)
Special Use Areas[2]	27,534	No Surface Occupancy (NSO)	White Sands RMP (1986); Mimbres RMP (1993)
Special Use Areas[3]	169,710	Controlled Surface Use (CSU)	White Sands RMP (1986); Mimbres RMP (1993)
Remainder of Planning Area	3,655,138	Standard Lease Terms and Conditions.	White Sands RMP (1986); Mimbres RMP (1993)

NOTES:
[1]Non-discretionary closures are those required by law or policy and cannot be changed in an RMP. Discretionary closures are administrative decisions and can be imposed or changed through an RMP.
[2]Includes communication sites, Recreation and Public Purposes sites, ecological study sites, recreation sites, ACECs, and historic trails.
[3]Includes Butterfield Trail, Jornada Experimental Range, NMSU Rangeland Research Center, WSMR Safety Evacuation Zone.

These results have led to the conclusion that the *Planning Area* has only low to moderate potential for the presence and production of oil and gas. None of the area has high potential. Approximately one-third of the *Planning Area* is considered to have moderate potential for oil and gas, although as of 2010 no production has occurred. The remainder of the *Planning Area* has low potential.

Current Leases: As of August 2011, there were 40 oil and gas leases totaling approximately 50,190 acres in the *Decision Area* and none of these leases were in production at that time. These numbers include 21 leases in Otero County totaling 14,110 acres and one pending lease of 1,600 acres; and 19 leases in Doña Ana County totaling 29,582 acres northwest of Las Cruces and near the International border west of Santa Teresa. There were no active oil and gas leases in Sierra County as of August 2011.

Known Occurrences and Prospective Areas:

Sierra County*:* The Palomas Basin was tested using six wells in the 1940s and 1950s and two wells in the late 1970s and early 1980s. One well had oil and gas shows but no production. The northern portion of the Jornada del Muerto Basin was tested using 20 wells from the 1920s to the 1980s. Three of those wells had oil or gas shows, but there was no production. Three wells drilled and tested geologic features not associated with a sedimentary basin, and no shows were reported.

Otero County*:* The Tularosa Basin was tested using 12 wells from the 1950s through the 1980s. One well had a gas show, and one well had an oil and gas show, but there was no production. A more recently drilled well in the eastern Tularosa Basin reported potential for natural gas production (October 1991). Between 1961 and 2000, six wells were drilled and tested the Salt Basin graben in the southeastern part of the county. There was an oil show reported in one well, but no production. Nine wells were drilled and tested the Pennsylvanian rocks in the Sacramento Basin from the 1950s to the 1980s, and no shows were reported in those wells. The Hueco Basin was tested using three wells between 1942 and 1950, and one well reported an oil show, but there was no production. The Mississippian and Pennsylvanian rocks on the Otero Platform were tested using 30 wells. Three of the wells reported gas shows, but no production.

In 1997, a gas find on Otero Mesa created interest in the area from the oil and gas industry. Large numbers of lease nominations prompted BLM to review the 1986 *White Sands RMP* to establish the adequacy of guidelines for fluid minerals leasing and development and it was determined that those guidelines were insufficient given potential for increased leasing in the area. The BLM Las Cruces District then prepared an amendment to the *White Sands RMP* to address fluid mineral leasing and development in Sierra and Otero County (2005). That RMP amendment was appealed by several groups and subsequently found to be in violation of NEPA by the 10th Circuit Court of Appeals. The plan amendment was thus invalidated by the District Court for the District of New Mexico (See Chapter 1).

Doña Ana County*:* The Hueco Basin was tested through drilling five wells in the 1930s and 1940s. Three of those wells had oil shows, and one well had oil and gas shows, but there was no production. Nine wells tested the Mesilla Basin from the 1940s to 1993. Two of the wells had oil and gas shows, and one well had gas shows, but there was no production. Three wells drilled and tested geologic features not associated with a sedimentary basin, and no shows were reported.

3.4.6.1.2 Geothermal

A report prepared by the DOE in cooperation with BLM identified the *Planning Area* as having high potential for renewable power from geothermal resources (USDOE 2003). Geothermal resources are renewable, leasable fluid-mineral energy resources with a history of successful application in New Mexico. Current uses include aquaculture, crop and food processing, and heating of residential and commercial spaces, greenhouses, swimming pools, and spas. Sources of geothermal energy include artesian hot springs and wells that tap into groundwater or dry rock at elevated temperatures that result from high heat-flow gradients in the subsurface. New sources of geothermal energy have been discovered by drilling exploratory wells in areas of known or suspected high-temperature gradients or by coincidence when drilling for oil, gas, or water resources. Information on the known occurrences of geothermal energy resources in the *Planning Area* is shown on Map 3-12.

Known Occurrence and Prospective Areas: Areas of highest geothermal potential in the *Decision Area* are along the Rio Grande Rift through Doña Ana and Sierra Counties. (See Map 3-12.) Known geothermal energy resources are clustered at several locations with their sources in a convective geothermal system (Witcher 2004). Existing commercial uses of geothermal resources include hot springs and mineral baths that are open to the public in the Truth or Consequences area and heated greenhouses in the Radium Springs area.

Geothermal Leasing Activity: As of this report, there are two active geothermal leases in the *Planning Area* totaling 440 acres, both of which are located in Doña Ana County. The smaller lease (160 acres) is located near Tortugas Mountain ("A" Mountain) in Las Cruces. The other lease (280 acres) is located on split-estate near the town of Radium Springs. Both leases are direct-use applications for greenhouse heating, but neither lease is currently in production. There are two pending geothermal leases near Rincon (8,328 acres) and north of Radium Springs (1,640 acres) in Doña Ana County. There are no authorized geothermal leases in either Otero or Sierra Counties.

3.4.6.1.3 Locatable Minerals

Locatable minerals are defined as those minerals that may be claimed under the 1872 Mining Law as amended. Locatable minerals include both metallic minerals (e.g., gold, silver, lead) and nonmetallic minerals (e.g., gemstones, perlite). Locatable minerals can be obtained by staking and filing a mining claim and can be extracted by mining or quarrying methods. Although there are many mining claims and inactive mines in the *Planning Area*, as of 2010 no large active mining operations exist.

Significant locatable mineral deposits are defined by McLemore (2005) as world-class or large deposits of economic importance today. Significant mineral deposits may attract mining companies to explore and develop these resources. Sierra, Otero, and Doña Ana Counties have several locatable mining districts with significant mineral deposits. There are four significant metallic mineral districts in Sierra County, one district in Otero County, and one district in Doña Ana County.

Known Occurrences and Prospective Areas: Metallic and nonmetallic mineralized areas in the *Planning Area* are designated as mining districts. Mining districts are areas where prospective areas for mineral resources are located or mining has been conducted. There are 25 metallic mineral mining districts in Sierra, Otero, and Doña Ana Counties.

Historical reviews of mineral exploration and development in each county by the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) have documented locatable mineral commodity types and production data for all the districts. Most of these districts have been mined historically and are no longer active.

Mineralized Areas and Types:

Sierra County*:* There are four mining districts in Sierra County: Chloride, Hermosa, Hillsboro, and Kingston. All four districts contain metallic mineral resources, and one district also contains nonmetallic mineral resources. Geologic conditions that account for the development of the mineral resources include volcanic-epithermal veins and replacement and skarn deposits.

In the 1980s, an open pit mine was established for mining copper at a site called Copper Flats east of Hillsboro. This mine operated for less than a year. In the mid-1990s, another mining company was interested in reopening the mine but it never occurred. In 2011, a subsidiary of a Canadian mining company submitted a mine plan of operation to reopen the mine.

Otero County*:* Orogrande is the only significant mining district in Otero County. The district contains metallic and nonmetallic mineral resources. Geologic conditions that account for the development of the mineral resources include a Great Plains Margin skarn deposit.

Doña Ana County*:* Organ Mountains is the only significant mining district in Doña Ana County. The district contains metallic and nonmetallic mineral resources. Geologic conditions that account for the formation of the mineral resources include Rio Grande Rift deposits, volcanic-epithermal veins and replacement, and skarn deposits.

3.4.6.1.4 Mineral Materials (Salable Minerals)

The BLM defines common varieties of sand, gravel, stone, pumice, pumicite, cinders, and ordinary clay as mineral materials (BLM 1997b). Mineral materials include materials used for building and construction and landscaping and fill. Sand, gravel, aggregate, lime (limestone), cinders, and building stone are the more common mineral materials. Mineral materials are disposed from Federal land through

negotiated or competitive sales to commercial producers; or through free-use permits to government agencies and non-profit groups. Local BLM offices may also establish Community Pits and Common Use Areas for general disposals and small-volume sales of mineral materials. The New Mexico Bureau of Geology and Mineral Resources reports that many inactive or intermittently operated aggregate pits are located in the *Planning Area* (Barker 2002).

Most applications for mineral material sales and free-use must go through the NEPA review process. The exceptions are sales and free-use from community pits and common use areas. These sites have already been evaluated through NEPA review and have been designated as suitable for extraction of mineral materials. Permits for community pits and common-use areas are sold "*over the counter*" and do not require individual Environmental Assessments.

Known Occurrences and Prospective Areas: The known locations of salable minerals in the *Planning Area* are too numerous to discuss on an individual basis. This information is included in the *TriCounty Analysis of the Management Situation's* Appendix E, Table E-4, which lists the information available for known pits; this document is available for review from BLM Las Cruces District Office.

Salable Minerals Current Activity:

Sierra and Otero Counties*:* Sand, gravel, and stone are the most common salable mineral materials in Sierra and Otero Counties. They are generally found along mountain pediments, alluvial valley floors, and in arroyos adjacent to mountain uplifts. Eolian sand is found in the Tularosa Valley. Cinders, fill material, building stone, and clay occur in minor amounts throughout the Counties. At the present, there are no active mineral materials sales or free-use permits in Otero County. In Sierra County, limestone aggregate is produced from two negotiated sale sites and the Sierra County Road Department has obtained fill material from the BLM land through free-use permits.

Doña Ana County*:* Sand, gravel, and stone are the most common salable mineral materials in Doña Ana County. Sand and gravel deposits are most abundant along the Rio Grande Valley, but also occur in intermountain basins throughout the County. The saleable mineral locations near the community of Las Cruces that have a wider range of aggregate size lie east of the Rio Grande and closer to the Organ Mountains (Austin et al. 1998). Volcanic cinders occur in the West Potrillo Mountains, and building stone has been mined in the Robledo Mountains. Clay deposits used in brick making also occur in southern Doña Ana County, and caliche is common throughout the *Planning Area* (USDOI BLM 1990). There are only a few quality sand and gravel locations remaining close enough to Las Cruces to be economically feasible for use in construction.

A summary of recent commercial (i.e. competitive and negotiated contracts) mineral materials production in the *TriCounty* area is presented below in Table 3-39.

TABLE 3-39
COMMERCIAL MINERAL MATERIAL PRODUCTION FROM BLM-ADMINISTERED MINERAL ESTATE FISCAL YEAR 2010 (OCTOBER 1, 2009 TO SEPTEMBER 30, 2010):

COUNTY	MATERIAL TYPE	NUMBER OF OPERATIONS	PRODUCTION	ROYALTY RECEIVED
Doña Ana	Sand and gravel	5	39,558 cubic yds.	$28,032.20
Doña Ana	Basalt cinder	1	2,055 cubic yds.	$1,459.05
Doña Ana	Decorative stone	2	785 tons	$1,544.91
Doña Ana	Fill	1	28,485 cubic yds.	$19,939.50
Sierra	Aggregate	2	57,058 tons	$28,521.84

3.4.7 ABANDONED MINE LANDS

In 2008, the Department of the Interior, Office of Inspector General published its findings (*Audit Report, Abandoned Mine Lands in the Department of the Interior,* C-IN-MOA-0004-2007, July 2008) regarding the abandoned mine land (AML) program on lands managed by Department of the Interior agencies. That report found that staffing and funding for the program were insufficient, that site inventories were generally poor or non-existent, and that among other deficiencies, occupancy trespass of abandoned mine lands was often ignored.

In 2009, the Las Cruces District received funding to begin an AML program that is expected to continue through 2015 or longer. As of 2010, 73 locatable mineral mining districts had been delineated in the Las Cruces District, of which some 25 are in the *TriCounty Planning Area*. Through a Memorandum of Understanding with the State of New Mexico, Mining and Minerals Division of the Energy Minerals and Natural Resources Department, BLM inventories features on BLM lands, adjacent State trust and private lands. Once features are inventoried, they are assessed as to their danger to people and animals; the best way to remediate or reclaim a feature as well as a priority for remediation is also determined.

Mine features associated with abandoned mine areas include shafts, adits, tunnels, pits, spoil piles, old machinery, and collapsed buildings. Many of these features can be hazardous to people, livestock and wildlife. Across the west in recent years several fatalities have occurred. Hazards associated with abandoned mines include:

- Loose rocks which can fall at any time and cause serious head injuries
- Collapsing roofs or walls
- Driving or falling into shafts and being killed, injured or unable to get out
- Dark adits frequently have shafts in them that cannot be seen
- Air containing poisonous gases or insufficient oxygen in adits, shafts or tunnels cannot be detected until too late

The overall goal of the AML program is to protect human health and safety, while the objectives to achieve this are to:

- identify sites
- develop and maintain an accurate inventory
- prioritize sites for remediation
- temporary safety measures, fencing and signing most dangerous features
- report accomplishments
- build partnerships
- follow-through on collaborative projects to completion
- monitor and maintain sites after inventory

Inventory is the first step in the process and includes identifying mining districts and sites using available information including maps. To date, over 400 mining features in the *TriCounty Planning Area*, primarily around Orogrande and the Jarilla Mountains in Otero County, have been inventoried. Information collected or determined from the inventories include a location using GIS technology, photos of features, adit or shaft depth, distance from road and a danger level assessment. Danger levels range from extreme to none based on depth of feature, proximity to roads or population centers, topographically, visibility and stability of the site. The inventory team also assesses the mine features for their potential for remediation or reclamation to eliminate danger to people and animals. Options for remediation or reclamation include backfilling, gating, or fencing the features.

Prior to any ground disturbance, mine features are surveyed to determine their value as wildlife habitat, especially for bats and for their historical resources. These surveys may be done by the BLM or New Mexico Mining and Minerals Division personnel or they may be contracted to a qualified consultant. As this part of the assessment is completed, the BLM will work with the New Mexico Mining and Minerals Division to plan and fund the reclamation work. The reclamation process also includes preparing the necessary site-specific NEPA documents.

3.5 SOCIOECONOMIC CONDITIONS

Socioeconomic conditions include the individual resources of social conditions, economic conditions, health and safety, environmental justice, and Tribal treaty rights. This section describes the existing socioeconomic conditions in the *Planning Area*, including demographics, employment and income, key industries related to BLM management, place-based values, and environmental justice populations.

3.5.1 DEMOGRAPHICS

Demographic data were compiled from the 1990, 2000, and 2009 U.S. Census to characterize the population size, density, age, race, and ethnicity for Sierra, Otero, and Doña Ana Counties and the Mescalero Apache Nation. Statistics from the *Planning Area* have been compared to those of New Mexico and the United States to provide a basis for comparison to a larger area. The Sonoran Institute's Economic Profile System was used to compile data and was supplemented by additional U.S. Census Bureau or other data as necessary. A separate socioeconomic baseline report was prepared in March 2006 that included additional information.

While all three counties showed a robust population increase in the decade of the '90s, population growth slowed considerably from 2000 to 2009. Doña Ana County continued to show relatively strong growth but Otero County increased by only 1 percent and Sierra County's population actually declined by 3 percent. (See Table 3-40.)

TABLE 3-40
COMPARISON OF COUNTY POPULATIONS 1990, 2000, 2010

LOCATIONS	1990 POPULATION	2000 POPULATION	2010 POPULATION	PERCENTAGE GROWTH	
				1990-2000	2000-2010
Sierra County	9,912	13,720	11,988	34	-3
Otero County	51,928	62,298	63,797	21	1
Doña Ana County	135,510	174,682	209,233	29	18
Planning Area	197,350	250,250	285,018	27	13
New Mexico	1,515,069	1,819,046	2,059,179	20	11
United States	248,709,873	281,421,906	307,006,550	13	9

SOURCE: U.S. Census Bureau 2010

3.5.1.1 Sierra County

Sierra County is the least populated County in the *Planning Area*, having a population of 11,988 in 2010 (see Table 3-40). It is generally rural with large proportions of land historically used for agriculture and ranching. The population density was three people per square mile in 2009. The largest community in Sierra County is Truth or Consequences, with a 2005 population of 7,071 people, who compose about 60 percent of the County's overall population. Growth is occurring in and around Elephant Butte, which

abuts Elephant Butte Reservoir. The County features two reservoirs, Elephant Butte and Caballo, used frequently by both local and out-of-state visitors (U.S. Census Bureau 2000).
Sierra County, more than either Otero or Doña Ana Counties, has the largest percentage of residents age 65 and over. In 2009, residents of retirement age composed 29 percent of the County population in Sierra County, a proportion that is significantly larger than the State of New Mexico's figure of 13 percent. While overall population increased in Sierra County between 1990 and 2000, the population decreased by 3 percent between 2000 and 2009.

The largest racial group in Sierra County is White (66 percent). About 30 percent of the County population is Hispanic or Latino, which is a lower proportion than the other counties in the *Planning Area* and the State as a whole. To evaluate the presence of minority populations, data identifying racial and Hispanic minorities were aggregated for the study area (Table 3-41). The largest ethnic group in Otero County is White, not Hispanic or Latino (about 51 percent). About 32 percent are Hispanic or Latino (U.S. Census Bureau 2000). Otero County includes the Mescalero Apache Reservation and has a larger percentage of residents who are American Indian than the other counties in the *Planning Area*. The Mescalero Apache are addressed specifically in Section 3.4.8.1.3.

3.5.1.2 Otero County

The population of Otero County in 2000 was 63,797; a 22 percent increase over 1990. The population density within Otero County continues to remain relatively sparse at nine people per square mile. Alamogordo and Tularosa are the two largest communities, with a combined population of nearly 40,000 people, or about roughly 62 percent of the County's total population. Several smaller communities such as Cloudcroft and Timberon provide services for the rural population. Holloman Air Force Base is a major feature within Otero County. The fastest growing age group in Otero County since 1990 is 45 to 49 year olds. The population of people within retirement age (65 and older) has grown nearly 55 percent since 1990, and currently stands at 15 percent of the county population.

The largest racial group in Otero County is White (84.4 percent). About 35 percent are Hispanic or Latino (U.S. Census Bureau 2010). Otero County includes the Mescalero Apache Reservation, and has a larger percentage of residents who are American Indian than the other counties in the *Planning Area*.

3.5.1.3 Doña Ana County

Doña Ana County is the most populated county in the *Planning Area*. The 2010 population of Doña Ana County was 209,233 people, an 18 percent population increase since 2000 (see Table 3-40). Doña Ana County's 2010 population density is the highest within the *Planning Area*, at about 46 people per square mile. Las Cruces is the largest metropolitan area in the *Planning Area*, with a 2009 population of 93,680 people, or roughly 42 percent of the population of Doña Ana County. People younger than 18 years old compose 36 percent of the Doña Ana County population, which is higher than the State of New Mexico's figure of 32 percent. The median age is 27.9 years old, the lowest within the *Planning Area*. About 12 percent of the population of Doña Ana County is of retirement age (over 65). About 65 percent of people in Doña Ana County identify their ethnicity as Hispanic or Latino (see Table 3-41). About 30 percent identify themselves as White and not Hispanic. As compared to Sierra and Otero Counties and the State as a whole, Doña Ana County has a substantially larger share of the population that is Hispanic or Latino.

3.5.1.3.1 Mescalero Apache Nation

Located in northeastern Otero County on 720 square miles of reservation land, the Mescalero Apache Nation has a population of 3,156 people, 91.5 percent of whom are American Indian and Alaska Native (U.S. Census Bureau 2000). The median age on the reservation of 22.6 years is younger than the averages for the rest of the *Planning Area*, New Mexico, and the Nation. The largest age category is 10- to-14-year-olds, who compose almost 13 percent of the total population. The reservation is generally rural with an average of four people per square mile.

3.5.1.4 Employment and Income

3.5.1.4.1 Employment by Industry

Table 3-42 provides data on the number and share of employment provided by each industry in the *Planning Area*, in New Mexico, and in the Nation. Government and government services currently provide the largest share of employment in the *Planning Area* (ranging from 18 percent in Sierra County to over 36 percent in Otero County) as well as the largest share of employment statewide (19 percent). Approximately 34 percent of government-related employment in Otero County is with the military. Nationwide, government employment is less dominant (14 percent). In both the *Planning Area* and State, health care and retail trade are also large employment providers. Otero County also has a relatively high share of employment in accommodation and food services, which may be a reflection of the importance of recreation to the local economy.

Between 1970 and 2000, the services and professional sector experienced the most dramatic increase in employment. Sierra County showed growth of 36.3 percent in the services category and 19.5 percent in retail trade (U.S. Department of Commerce, Bureau of Economic Analysis 2002). In Otero County, 87.1 percent of new job growth occurred in the services and professional sector, with services accounting for 34.5 percent of overall job growth, and retail trade for 28.5 percent. In Doña Ana County, 65 percent of new employment between 1970 and 2000 occurred in the services and professional sector, particularly in the services category (accounting for 37.4 percent of overall job growth) and retail trade (17.2 percent).

The growth of nonlabor income in the *Planning Area* also explains the condition of declining earnings per job while per capita income is increasing. Nonlabor income is personal income that is earned through investments (such as dividends, interest, and rent) or through transfer payments. Most transfer payments are from the government to individuals, including retirement-related payments, Medicare, disability insurance payments, and welfare. (Transfer payment figures do not include income from private pension plans or 401(k) plans.) Nonlabor income contributes a larger share of total personal income in all three counties within the *Planning Area* than it does on a Statewide or National level (Table 3-44). In particular, Otero County has an exceptionally high percentage of personal income (almost 61 percent) derived from nonlabor sources. Approximately a third of the transfer payments in Otero County have been identified as retirement-related transfer payments.

TABLE 3-41
ETHNICITY IN THE *PLANNING AREA*

ETHNIC GROUP	SIERRA COUNTY		OTERO COUNTY		DOÑA ANA COUNTY		NEW MEXICO		UNITED STATES	
	Number in Population	Percent of Total	Number in Population	Percent of Total	Number In Population	Percent of Total	Number in Population	Percent of Total	Number in Population	Percent of Total
White not Hispanic	8,505	66.3%	22,373	51.4%	62,751	30.4%	821,955	40.9%	199,861,264	65.1%
Hispanic or Latino Origin	3,865	30.6%	32,485	35.4%	134,585	65.2%	916,410	45.6%	48,507,035	15.8%
Black	77	0.6%	3223	5.1%	7,018	3.4%	62,300	3.1%	39,603,845	12.9%
American Indian and Alaska Native	258	2.0%	4,298	6.8%	3,303	1.6%	194,938	9.7%	3,070,066	1.0%
Asian	26	0.2%	885	1.4%	2,064	1.0%	30,145	1.5%	14,122,301	4.6%
Native Hawaiian and other Pacific Islander	13	0.1%	126	0.2%	206	0.1%	4,019	0.2%	614,013	0.2%
Two or more races reported	168	1.3%	1,454	2.3%	3,096	1.5%	38,184	1.9%	5,219,111	1.7%
TOTAL[1]	12,912	100%	64,844	102.1%	213,023	103.2%	2,067,951	102.9%	310,997,634	101.3%

SOURCE: US Census Bureau (2010): www.quickfacts.census.gov/qdf/states
NOTE: [1.]Total percentage may be more than 100 because of double counting in some ethnic groups

TABLE 3-42
2008 EMPLOYMENT BY INDUSTRY

	SIERRA COUNTY		OTERO COUNTY		DOÑA ANA COUNTY		NEW MEXICO		UNITED STATES	
	Number of Jobs	Percent of Share	Number of Jobs	Percent of Share	Number of Jobs	Percent of Share	Number of Jobs	Percent of Share	Number of Jobs	Percent of Share
Farming	361	7.1	541	1.9	2,984	3.2	24,532	2.2	2,642,000	1.5
Private Employment	3,817	74.6	17,418	61.7	66,989	72.8	880,216	78.8	154,536,100	85.0
Forestry, fishing, and related activities	N/A	N/A	N/A	N/A	1,059	1.2	5,410	0.5	858,500	0.5
Mining	N/A	N/A	67	0.2	177	0.2	27,555	2.5	1,155,900	0.6
Utilities	N/A	N/A	N/A	N/A	332	0.4	4,532	0.4	590,700	0.3
Construction	517	10.1	1,969	7.0	6,378	6.9	79,641	7.1	11,151,000	6.1
Manufacturing	163	3.2	397	1.4	3,541	3.8	41,611	3.7	14,090,900	7.8
Wholesale trade	N/A	N/A	277	1.0	1,618	1.8	29,399	2.6	6,570,500	3.6
Retail trade	606	11.8	3,137	11.1	8,863	9.6	119,843	10.7	18,862,200	10.4
Transportation and warehousing	94	1.8	632	2.2	2,562	2.8	27,691	2.5	6,018,500	3.3
Information	24	0.5	304	1.1	1,147	1.2	18,936	1.7	3,529,800	1.9
Finance and insurance	113	2.2	610	2.2	2,383	2.6	34,575	3.1	9,023,400	5.0
Real estate and rental and leasing	216	4.2	1,147	4.1	2,863	3.1	45,629	4.1	8,369,700	4.6
Professional and technical services	273	5.3	1,139	4.0	4,886	5.3	83,672	7.5	12,347,100	6.8
Management of companies and enterprises	N/A	N/A	43	0.2	133	0.1	5,663	0.5	1,993,300	1.1
Administrative and waste services	95	1.9	1,149	4.1	4,085	4.4	60,954	5.5	10,999,200	6.1
Educational services	N/A	N/A	155	0.5	867	0.9	16,762	1.5	3,877,000	2.1
Health care and social assistance	N/A	N/A	2,650	9.4	13,029	14.2	115,883	10.4	18,593,400	10.2
Arts, entertainment, and recreation	N/A	N/A	296	1.0	1,908	2.1	23,887	2.1	3,860,200	2.1
Accommodation and food services	N/A	N/A	1,758	6.2	6,589	7.2	84,138	7.5	12,314,700	6.8
Other services, except public administration	298	5.8	1,372	4.9	4,569	5.0	54,435	4.9	10,329,100	5.7
Government and government enterprises	937	18.3	10,257	36.4	22,004	23.9	212,685	19.0	24,577,000	13.5
Federal, civilian	115	2.2	1,892	6.7	3,857	4.2	30,737	2.8	2,817,000	1.5
Military	34	0.7	3,521	12.5	588	0.6	14,277	1.3	2,079,000	1.1
State government	297	5.8	949	3.4	8,818	9.6	60,469	5.4	5,259,000	2.9
Local government	491	9.6	3,895	13.8	8,741	9.5	107,202	9.6	14,422,000	7.9

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, 2010.
NOTES: NA = Data not available. Data are suppressed to protect confidentiality. Numbers do not add to total employment figure because of data that have been suppressed for confidentiality.

TABLE 3-43 TRENDS IN PER CAPITA INCOME AND AVERAGE EARNINGS PER JOB						
AREA	PER CAPITA INCOME			AVERAGE EARNINGS PER JOB		
	2000	2008	PERCENT CHANGE 2000-2008	2000	2008	PERCENT CHANGE 2000-2008
Sierra County	$18,280	$26,594	+38	$24,880	$34,297	+23
Otero County	$17,550	$25,167	+29	$33,145	$46,484	+24
Doña Ana County	$18,102	$27,855	+35	$29,352	$41,982	+31
New Mexico	$22,751	$33,389	+34	$34,350	$47,886	+21
United States	$30,906	$33,389	+8	$42,003	$56,116	+38
SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis 2010 (http://www.bea.gov/regional/reis/action.cfm)						

3.5.1.4.2 Unemployment

In 2010, the average annual unemployment rates in all three counties – Doña Ana County (8.2 percent), Sierra County (6.8 percent), and Otero County (7.4 percent) – were lower than the rates in New Mexico (8.4 percent) and Nationwide (8.6 percent)(Bureau of Labor Statistics 2011).

3.5.1.4.3 Payment In Lieu Of Taxes

One source of local government revenue is payment in lieu of taxes (PILT) payments, or Federal payments to local governments that help to offset losses in property taxes due to nontaxable Federal land within their boundaries (see Table 3-45). Payments are made annually for tax-exempt Federal lands administered by the BLM, the National Park Service, the U.S. Fish and Wildlife Service (all agencies of the Interior Department), the U.S. Forest Service (part of the U.S. Department of Agriculture), and for Federal water projects. Federal land within county boundaries is not part of the county's tax base; through PILT, the county is compensated for lost revenue opportunities in accordance with the Payment in Lieu of Taxes Act of 1976, as amended (31 U.S.C. 6901-6907). PILT payments are computed based on the number of acres of Federal entitlement land, within each county. Generally, entitlement lands do not include military lands under active use. The number of qualified acres is multiplied by a dollar amount per acre set by law. Payments are subject to limitations based on population. Congress sets annual PILT program funding limitations that also may affect the amount of the payments under the program. Payment eligibility is reserved for local governments that provide services such as those related to public safety, environment, housing, social services, and transportation.

Over the past 10 years, BLM has accounted for 95 percent of all entitlement acreage in Doña Ana County, 66 percent in Sierra County, and 62 percent in Otero County as compared to the 56 percent of the BLM share in the State of New Mexico as a whole.

TABLE 3-44
2008 PERSONAL INCOME AND EARNINGS

	Doña Ana County		Otero County		Sierra County		New Mexico		United States	
Per capita income ($)	27,855		25,167		26,594		33,389		40,166	
Average Earnings per job ($)	41,982		46,484		34,297		47,886		56,116	
	Total	**Percent of Share**	**Total**	**Percent of Share**	**Total**	**Percent of Share**	**Total**	**Percent of Share**	**Total**	**Percent of Share**
Nonlabor income (in millions $)		60.9		37.6		37			2,842,330	31.9
Dividends, interest, and rent	850	25.3	245.4	18.5	61.4	16.5	8,096	17.6	1,550,330	17.4
Transfer payments	1,262	35.9	368.4	19.1	134.2	20.5	7,933	17.3	1,292,000	14.5
Government payments to individuals	86.1	34.5		17.9		19.2	7,448.20	16.2	1,221,000	13.7
Age-related transfer payments	51.5	20.6		9.9	319.3	8.7	3860.4	8.4	710,309	8
Labor income (in millions $)	**2,483**	**38.9**	**743.4**	**62.3**	**93.8**	**63**	**29,945**	**65.1**	**6,057,677**	**68.1**
Farming	NA 138	NA	10.7	NA	9.8	NA	128.9	0.3	28,133	0.3
Mining	2.6	NA	NA	NA	NA	NA	1,084.10	2.4	56,109	0.6
Oil & gas extraction	0.8		1.3		0.2					
Utilities	27	NA	NA	0.4	NA	0.4	293.2	0.6	69,891	0.8
Construction	193.9	NA	60.5	3	13.9	3.5	2,165.40	4.7	418,382	4.7
Manufacturing	165.6	NA	9.3	1	5.1	3.1	1,994.70	4.3	897,610	10.1
Wholesale trade	70.3	NA	8.9	0.3	NA	1.1	1,100.30	2.4	351,667	4
Retail trade	238.7	3.6	71.3	4.8	10.9	4.7	2,629.30	5.7	470,631	5.3
Transportation and warehousing	105	0.5		2	2.6	1.6	9,16.3	2	230,060	2.6
Information	47.4	0.4	11.2	0.8	0.5	1.1	714.8	1.6	255,972	2.9
Finance and insurance		1	21.2	1.4	3.0	1.7	1,264.40	2.8	508,816	5.7
Real estate and rental and leasing	31.8	0.6	7.0	0.6	1.8	0.6	674.5	1.5	170,804	1.9
Professional and technical services	281.1	1.2	41.2	2.5	10.4	4.1	3,032.10	6.6	638,942	7.2
Management of companies and enterprises	6.2	0	1.1	0.1	0	0.1	280.3	0.6	141,988	1.6
Administrative and waste services	119.4	1.1	22.8	3.2	1.5	1.4	1,261.10	2.7	244,527	2.7
Educational services	15.3	NA	2.3	0.2	NA	0.2	240.6	0.5	86,689	1
Health care and social assistance	477.2	NA	97.5	4.8	NA	7.7	3,040.80	6.6	627,922	7.1
Arts, entertainment, and recreation	32.4	0.4	2.5	0.1	NA	0.6	247.3	0.5	72,832	0.8
Accommodation and food services	122.1	2.8	26.2	1.3	NA	1.8	1,101.30	2.4	185,145	2.1
Other services, except public administration	144	1.6	39.8	1.6	8.0	2.1	982.8	2.1	208,558	2.3
Government and government enterprises	1,264.6	13.9	644.3	43	46.3	22.6	9,430.20	20.5	1,105,776	12.4
Federal, civilian	411.5		145.6		9.4		2,157.70		212,945	
Military	27.5		299.7		1.4		863.9		89,127	
State government	408.1	60.9	42.6	37.6	14.6	37	16,029	34.9	2,842,330	31.9
Local government	417.5	25.3	156.5	18.5	21.0	16.5	8,096	17.6	1,550,330	17.4
TOTAL PERSONAL INCOME (IN MILLIONS)	**5,610.8**	**35.9**	**1,593.8**	**19.1**	**337.8**	**20.5**	**7,933**	**17.3**	**1,292,000**	**14.5**

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis 2008 (www.bea.gov/regional/reis/action.cfm)

NOTES: Per capita income is the total personal income divided by population. Earnings per job is the total wages earned divided by the total number of workers. Transfer payments (under nonlabor income) include government payments to individuals (included in this table) as well as payments to nonprofit organizations and business payments to individuals.
DA = Data not available. Data are suppressed to protect confidentiality.[1]Includes farms and agricultural services.

3.5.2 KEY INDUSTRIES

3.5.2.1 Energy and Mineral Development

Mining has not represented a substantial share of employment or income in the *Planning Area* for several years. More recent data on mining employment have been suppressed for confidentiality. As metal prices have risen, interest in developing hard rock mining claims has increased.

The BLM's minerals program manages a variety of resources: (1) leasable minerals (fluid minerals such as oil, gas, geothermal, coal bed methane, and CO_2, as well as certain solid minerals such as coal, potash, and sulfur); (2) locatable minerals (metallic and nonmetallic minerals that can be obtained by filing a mining claim (e.g., gold, silver, fluorspar); and (3) saleable minerals (e.g., sand and gravel).

3.5.2.1.1 Fluid Minerals

New Mexico is an important producer of oil and gas energy resources, but the *Planning Area* is not a contributor to the Statewide industry. Exploratory wells have been drilled in the *Planning Area*, and gas has been detected in some wells, but no gas production has occurred. While there are leaseholds for oil and gas production in the *Planning Area*, there has been only one new fluid-mineral lease parcel sold within the last 10 years. There was a gas discovery on Otero Mesa in Otero County in the late-1990s and interest in exploration in that area increased substantially but it is still not clear if extensive energy resource development will occur in Otero Mesa. A second well was drilled in 2001; it discovered gas in a separate horizon. Both wells are currently shut in.

In 1991, a wildcat gas well drilled in Ysletano Canyon in Otero County northeast of Tularosa reported a natural gas show. This well is currently shut-in and is not producing. Information on exploratory activity is available in the *TriCounty Analysis of Management Situation.*

Unless otherwise closed to leasing, public land may be leased for development of fluid minerals. Oil and gas leases have a 10-year primary term and are sold quarterly at an oral auction. There is a minimum $2.00 per acre opening bid, but the winning bid can range to hundreds of dollars per acre for parcels having highly competitive interest. The successful lessee is required to pay an annual rent on the leased parcel. The rental costs range from $1.50 per acre per year for the first 5 years to $2.00 per acre per year for the last 5 years of the lease. A lease may be extended beyond its 10-year term if production has been established. The lessee also is required to pay royalties on the sales value of mineral resources produced from the leased parcel. Oil and gas royalties are 12.5 percent of sales value. Royalty payments are paid to the Office of Natural Resources Revenue (formerly the Minerals Management Service).

As of November 2011, the following oil and gas leases were authorized in the *Decision Area*: Doña Ana County had 21 leases over 39,853 acres and Otero County had 19 leases across 12,852 acres for a total of 40 leases over 52,705 acres.

TABLE 3-45 PILT ACRES AND ANNUAL PAYMENTS 2000-2010						
YEAR	COUNTY	Total Federal Entitlement Acres	BLM Public Land Acres	BLM % of Federal Entitlement Acres	Total Annual PILT Payment	Payment Amount Attributed to BLM Land
2000	Doña Ana	1,194,078	1,132,753	95	$936,036	$889,234
	Otero	1,493,633	931,535	62	$1,029,158	$638,078
	Sierra	1,336,628	854,143	64	$383,276	$245,297
2001	Doña Ana	1,194,075	1,132,750	95	$1,340,949	$1,273,901
	Otero	1,493,633	931,535	62	$1,483,335	$919,668
	Sierra	1,336,541	854,143	64	$608,801	$389,633
2002	Doña Ana	1,193,885	1,132,560	95	$1,410,223	$1,339,712
	Otero	1,493,623	931,525	62	$1,557,725	$965,789
	Sierra	1,336,541	854,143	64	$641,386	$410,487
2003	Doña Ana	1,193,065	1,131,740	95	$1,611,642	$1,531,059
	Otero	1,494,043	931,945	62	$1,790,542	$1,110,136
	Sierra	1,336,939	854,140	64	$723,243	$462,875
2004	Doña Ana	1,193,065	1,131,740	95	$1,655,605	$1,572,824
	Otero	1,494,043	931,945	62	$1,839,054	$1,140,213
	Sierra	1,336,939	854,143	64	$744,078	$476,209
2005	Doña Ana	1,193,047	1,131,740	95	$1,694,351	$1,609,633
	Otero	1,494,043	931,945	62	$1,855,662	$1,150,510
	Sierra	1,336,939	854,140	64	$762,903	$488,257
2006	Doña Ana	1,185,755	1,131,701	95	$1,712,726	$1,627,089
	Otero	1,494,123	931,945	62	$1,890,593	$1,172,167
	Sierra	1,299,574	854,122	66	$777,390	$513077
2007	Doña Ana	1,185,755	1,131,701	95	$1,703,334	$1,618,167,
	Otero	1,494,123	931,945	62	$1,883,272	$1,167,628
	Sierra	1,299,512	854,087	66	$773,198	$510,310
2008	Doña Ana	1,185,359	1,131,305	95	$2,702,838	$2,567,696
	Otero	1,494,123	931,945	62	$2,988,820	$1,853,068
	Sierra	1,299,512	854,087	66	$1,225,105	$808,569
2009	Doña Ana	1,185,359	1,131,305	95	$2,767,664	$2,629,280
	Otero	1,494,123	931,945	62	$3,070,399	$1,903,647
	Sierra	1,299,512	854,087	66	$1,210,735	$1,210,669
2010	Doña Ana	1,185,359	1,131,305	95	$2,831,596	$2,690,016
	Otero	1,494,123	931,945	62	$2,595,814	$1,609,404
	Sierra	1,299,512	854,087	66	$896,178	$591,477
Source: U.S, Department of the Interior, Payments in Lieu of Taxes (website)(2010)						

Areas of potential geothermal resources identified in Doña Ana County include Radium Springs, Rincon, Tortugas Mountain, and Tunoco Mountain. Other localities in the *Planning Area* with geothermal potential include Truth or Consequences and Hillsboro in Sierra County and Davis Dome in Otero County. Additional areas of high potential for geothermal resources have been identified in the *Planning Area*; more information is available in the *TriCounty Analysis of the Management Situation,* available from the BLM Las Cruces District Office. Existing commercial uses of geothermal resources in the *Planning Area* include hot springs and mineral baths that are open to the public in the Truth or Consequences area, and Federal geothermal resources that are leased at Radium Springs for heating a greenhouse facility. Previous research (Witcher 2004) indicates that geothermal resources at Rincon and Radium Springs could be hot enough, up to 150^0C, for electricity production, although additional exploration and reservoir testing is necessary to ascertain the potential of these resources. Lower

temperature geothermal resources in the *Planning Area* could potentially be used for greenhouses, building heating and agricultural processing.

As of November 2011, 440 acres of BLM surface and subsurface were under active geothermal leases, all in Doña Ana County. As of August 2011, there were no mineral leases in Sierra County. Currently, there is no production occurring from existing mineral leases in Doña Ana and Otero counties. Historically, the royalty value generated from mineral leases in the *TriCounty Planning Area* is miniscule compared to the overall royalty value in the State of New Mexico which was over $1.17 billion in 2009.

3.5.2.1.2 Locatable Minerals

There are many mining claims and inactive mines in the *Planning Area*. As metal prices continue to rise, reopening former mines, such as Copper Flat, may become profitable. However, BLM does not earn revenue from locatable mining activities.

3.5.2.1.3 Mineral Material (Saleable Minerals)

Mineral material or saleable minerals that are commonly produced on BLM-administered land in the *Planning Area* include sand, gravel, volcanic cinders (scoria), and stone. Table 3-46 provides the approximate number of registered operators that are mining mineral materials in the *Planning Area* and the number that are extracting resources from Federal land or mineral estate. Mineral materials mining of Federal minerals estate includes scoria, base course, sand, and gravel in Doña Ana County, and crushed rock and gravel in Sierra County.

BLM issues contracts to sell mineral materials to commercial producers and transfers production royalties to the U.S. Treasury. Total royalty payments in a given year depend on the demand for mineral materials in the *Planning Area*, which is generally determined by residential and road construction activity. During Fiscal Year 2010 (October 1, 2009 to September 30, 2010) over $80,000 in royalty for mineral materials was collected from permitted operations in the *Planning Area* (Table 3-39). BLM also issues free-use permits to government and nonprofit organizations to use mineral material for public purposes.

3.5.2.2 Agriculture and Grazing

Employment data related to farming and ranching show that ranch labor payroll totals approximately $2.8 million in Sierra County, $1.2 million in Otero County, and $37.5 million in Doña Ana County (National Agricultural Statistics Service 2002). Of the three counties in the *Planning Area*, Doña Ana County has the largest number of livestock. Based on the most recent figures available, Doña Ana County houses about 5 percent of the total number of cattle and calves in New Mexico. The market value for livestock and related products and for agricultural products generally, is largest in Doña Ana County. The *Planning Area*, however, does not constitute a substantial contributor to the overall statewide industry.

Table 3-47 indicates the total number of ranches with grazing permits and the source of those permits. Permits issued under the Taylor Grazing Act are administered by the BLM. The BLM provides the majority of grazing permits to ranches that are using them. The overall number of grazing permits issued increased between 1987 and 1997 (National Agriculture Statistics Service 1997).

TABLE 3-46
REGISTERED MINES IN THE PLANNING AREA AND PERCENT OF OPERATORS EXTRACTING FEDERAL MINERALS[1]

INDUSTRY AND COUNTY	REGISTERED OPERATORS	OPERATORS EXTRACTING FEDERAL MINERALS[2]	
		NUMBER	PERCENT
AGGREGATE AND STONE MINING			
Sierra County	26	12	46
Otero County	3	0	0
Doña Ana County	7	1	14
INDUSTRIAL MINERALS MINING AND MILLING			
Sierra County	3	2	66
Otero County	1	0	0
Doña Ana County	1	1	100
METALS			
Sierra County	0	0	0
Doña Ana and Otero counties	1	1	100

SOURCE: New Mexico Energy, Minerals, and Natural Resources Department et al. 2001; McLemore et al., 2005
NOTES:
[1] There are some discrepancies among sources concerning the number of active mines in the *Planning Area* (see *TriCounty Analysis of the Management Situation)*. However, these figures still provide a sense of how many BLM-administered minerals contribute to the viability of the industry in the *Planning Area*.
[2] The surface area may be managed by BLM or Forest Service.

TABLE 3-47
RANCHES WITH GRAZING AUTHORIZATIONS BY FEDERAL AGENCY

COUNTY	NUMBER OF RANCHES	GRAZING AUTHORIZATIONS			
		FOREST SERVICE	BLM	TRIBES	OTHER
Sierra County	64	10	45	1	18
Otero County	89	18	73	2	31
Doña Ana County	100	40	66	2	27
TOTAL FOR PLANNING AREA	253	68	184	5	76

SOURCE: U.S. Department of Agriculture, National Agricultural Statistics Service 1997

Grazing fees are received by the BLM according to the number of AUMs. Table 3-48 shows the total authorized AUMs by County within the *Planning Area* and the established grazing fee for each year from 1991 to 2010. The largest number of authorized AUMs is in Otero County. Otero County also has the most productive rangeland, as determined by rangeland production classes. (Refer to the *TriCounty Analysis of Management Situation* [BLM 2006] for further discussion.)

Grazing on public land generates revenue through the grazing fees, surcharges on pasturing agreements, and penalties for unauthorized grazing use. Grazing fees are determined through a formula established in the Public Rangelands Improvement Act of 1978. Table 3-48 shows the AUMS authorized or billed by the Las Cruces District Office for each county from 1991 to 2010, and the annual grazing fee per AUM.

Fifty percent of all fees collected, or $10 million (whichever is greater) go to a range betterment fund in the Treasury. The fund is used for range rehabilitation, protection, and improvement including grass seeding and reseeding, fence construction, weed control, water development, and fish and wildlife habitat enhancement. Under law, one-half of the funds are to be used as the respective Secretary (Interior or Agriculture) directs, and the other half is authorized to be spent in the district, region, or forest that generated the fees, as the Secretary determines after consultation with user representatives.

Agency regulations contain additional detail. BLM regulations provide that half of the fund is to be allocated by the Secretary of the Interior on a priority basis, and the rest is to be spent in the state or district where derived. The states receive 12.5 percent of monies collected from lands defined in §3 of the Taylor Grazing Act of 1934 (Section 3 Allotments) and the remaining 37.5 percent of the collections is deposited in the Treasury. Section 3 lands are those within grazing districts for which the BLM issues grazing permits. By contrast, states receive 50 percent of fees collected from BLM land defined in §15 of the Taylor Grazing Act (Section 15 Allotments). Section 15 lands are those outside grazing districts for which the BLM leases grazing allotments. While the funds are allocated to the states, any state share is to be used to benefit the counties that generated the receipts (Cody 1996).

TABLE 3-48
AUTHORIZED AUMS BY COUNTY AND GRAZING FEES, 1991 TO 2010

YEAR	BILLED AUMs				Grazing Fee per AUM
	Doña Ana County	Sierra County	Otero County	Total	
1991	137,402	200,801	157,497	495,700	$1.97
1992	146,575	203,412	159,367	509,354	$1.92
1993	137,745	195,494	168,852	502,091	$1.86
1994	128,545	201,110	176,836	506,491	$1.98
1995	109,341	168,159	165,115	442,615	$1.65
1996	115,585	176,023	169,371	460,979	$1.35
1997	124,302	190,593	174,661	489,556	$1.35
1998	139,036	191,972	174,681	505,689	$1.35
1999	141,114	207,816	177,262	526,192	$1.35
2000	122,093	186,666	162,195	470,954	$1.35
2001	118,394	156,945	164,216	439,555	$1.35
2002	107,462	114,160	153,783	375,405	$1.43
2003	93,483	114,236	137,649	345,368	$1.43
2004	79,288	98,764	110,347	288,399	$1.43
2005	87,996	128,640	105,914	322,550	$1.79
2006	87,675	133,626	122,469	343,770	$1.56
2007	98,153	151,283	138,064	387,500	$1.35
2008	101,633	153,614	146,972	402,219	$1.35
2009	104,212	153,199	143,124	400,535	$1.35
2010	101,807	142,133	133,449	377,389	$1.35
20-year average	114,092	163,432	152,091	429,616	$1.45

SOURCE: Bureau of Land Management, 2003c.

3.5.2.3 Recreation

BLM earns revenue from recreation fees generated at selected sites. Currently, three fee areas exist within the *Planning Area*: Three Rivers Petroglyph Site; Dripping Springs Natural Area; and Aguirre Spring Campground. Until May 2012, the fees for entry to these recreation areas had not been changed since they were established in 1989. Prior to May 2012, the fees were $2 and $3/vehicle for day use (depending on the site), and were some of the least costly fee areas in New Mexico. Following a public process and subsequent Resource Advisory Council recommendation, the fees are now established at $5/vehicle for day use and $7/vehicle for overnight camping (at Aguirre Spring Campground and Three Rivers Petroglyph Site). This fee is still lower than most recreation sites, but much more comparable with

fees charged elsewhere. The revenue generated from fees is used primarily for janitorial services, providing for on-site volunteer hosts, upkeep of the sites, and new developments within the sites.

Since 2000, annual visitation to the Three Rivers Petroglyph Site ranged from 18,000 to just over 22,000 and generated revenues averaging from $11,000 to $13,000 annually. Visitation to Three Rivers generally has decreased since 2000. Visitation has been highest at the Aguirre Spring Campground since 2000, averaging about 56,500 visitors annually and generating annual average revenue of about $24,500. During the same year, Dripping Springs Natural Area averaged just over 22,000 visitors and generated average revenue of about $18,700.

BLM issues SRPs in accordance with 43 CFR 2930. Commercial, competitive, and large group activities are among the uses that are likely to require a special recreation permit. Table 3-49 shows the number of special recreation permits issued and the revenue generated from them over a 5-year period. Income from these events benefits, but does not consistently sustain, local economies due to the short-term influx of visitors to an area.

TABLE 3-49
SPECIAL RECREATION PERMITS ISSUED BY THE LAS CRUCES DISTRICT OFFICE

FISCAL YEAR	NUMBER OF PERMITS	REVENUE GENERATED
2000	17	$7,059
2001	18	$6,152
2002	14	$5,700
2003	13	$7,232
2004	15	$6,181
2005	19	$7,717
2006	16	$8,439
2007	15	$9,300
2008	18	$10,451
2009	21	$12,000
2010	26	$12,856

3.5.2.3.1 Local Expenditures

Visitors to recreational opportunities within the *Planning Area* support employment in local economies. Recreation opportunities provided on BLM-administered land provide an attraction for visitors to the *Planning Area*. Recreational expenditures typically include outfitting, retail and food, and lodging services. Recreation-related employment may be seasonal, and can be irregular. Sierra County, which includes popular recreational destinations such as Caballo and Elephant Butte reservoirs, has a relatively large share of employment provided by accommodation and food services. Trends in recreational expenditures are likely to be more influential in and around Elephant Butte and Truth or Consequences as a result.

The 2001 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation, completed by the USFWS every 5 years, provides a sense of the local expenditures that are associated with those types of recreation. According to the most recent survey, 884,000 people enjoyed recreational opportunities in New Mexico, spending over $464 million on hunting and fishing and $558 million on wildlife watching for a total of more than $1 billion (USFWS 2002b). These expenditures included outfitting, retail, food, and lodging services that served to support local service industries.

BLM also has estimated expenditures by hunters on BLM-administered land on a state-by-state basis. It is estimated that over 22,000 people hunted on BLM-managed land in New Mexico, spending an average

of $1,164 per hunter. Total expenditures in New Mexico related to hunting on public land are estimated to total over $26 million (USDI BLM 2004d). BLM also estimated that there are a total of 113,733 wildlife viewers on BLM-administered land in New Mexico, spending an average of $832 per wildlife viewer. The total estimate for expenditures related to wildlife viewing on public land is more than $102 million (USDI BLM 2004d). A recent visitor study also estimated local expenditures by visitors; results are listed in Table 3-50 and are conservative estimates because answers left blank on surveys were assumed to equal $0, resulting in a lower average expenditure.

Outside of fee areas, data are not available for visitation to public land in the *Planning Area*, which generates the local expenditures. Recreational use on BLM-administered public land in New Mexico, however, is estimated to total almost 2.2 million visits and 1.77 million visitor-days. About 56 percent of visits occur in dispersed areas (USDI BLM 2004d).

Currently, active special-recreation permittees include organizers of equestrian-endurance rides, motorcycle races, and a mountain-bike race, among other events. These events may bring in visitors from outside the region for short durations, resulting in local expenditures related to food, lodging, equipment, or other services. In addition, three current permittees are outfitters. These businesses provide employment in the local area and generate commercial revenue from the use of public land that will be filtered through the local economies.

TABLE 3-50
AVERAGE EXPENDITURES PER VISITOR TO LOCAL BLM SITES

CATEGORY	AVERAGE EXPENDITURE
Lodging	$284.60
Guide fees	$168.08
Equipment rentals	$127.74
Shopping	$89.29
Restaurant dining	$89.16
Groceries	$74.33
Local transportation	$66.88
Camping fees	$24.90
Other expenses (not listed in this table)	$98.25

SOURCE: Bureau of Land Management 2004d

3.5.2.4 Lands and Realty

The R&PP Act authorizes BLM to lease or sell public land for recreational or public purposes to State and local governments and to qualified nonprofit organizations. Examples of typical uses allowed under the R&PP Act are historical monument sites, campgrounds, schools, firehouses, law enforcement facilities, municipal facilities, hospitals, parks, and fairgrounds. The sale, exchange, or lease of public land may have positive effects in the local community due to the availability of public services, increased property values resulting from the community amenity, and tax revenue generation.

3.5.2.4.1 Rights-of-Way

BLM issues rights-of-way over, upon, under, or through public land. Currently, the vast majority of the rights-of-way granted in the area managed by the Las Cruces District Office are authorized under Title V of FLPMA (43 U.S.C. 1761 to 1771). Fees paid to BLM that are associated with a right-of-way grant and include fees for processing the application and monitoring compliance with the terms and conditions of

the grant and the annual rental costs, which are based on fair market value. Processing and monitoring fees for minor category projects are charged according to a schedule. Costs for major category projects vary depending on the scope of the project.

3.5.2.4.2 Permits, Leases, and Easements

Proposals for non-Federal use of public land (for other than casual purposes) are outlined in 43 CFR 2090. Any use not specifically authorized under other laws or regulations and not specifically forbidden by law may be authorized under these regulations, including residential, agricultural, industrial, and commercial uses, and uses that cannot be authorized under Title V of the FLPMA of 1976 or Section 28 of the Mineral Leasing Act. Land use authorizations are categorized as leases, permits, and easements. Regulations for land use authorizations allow for the collection of rental fees as determined by the authorized officer. The rent is to be based either on the fair market value of the rights authorized in the land use authorization or as determined by competitive bidding. Rental fees for leases and easements may be adjusted every 5 years or earlier, as determined by the authorized officer, to reflect current fair market value. A nonrefundable processing fee of $25 accompanies each request for renewal, transfer, or assignment of a lease or easement. The conditions for the applicant to reimburse the United States for costs are similar to those described for rights-of-way (43 CFR 2800).

3.5.3 PLACE-BASED VALUES

Sierra County is associated with a retiree population and visiting recreationists. These locations are identified as recreation destinations, particularly for water-related recreation. This constitutes a shift from its previous identity as primarily a ranching community (James Kent Associates 2003). Recreation is viewed as a potentially strong foundation for the growth of local economies in the county (URS 2005b).

Otero County is most influenced by the military because of the strong economic and social links that have been established over time. Otero County contains several military facilities, including White Sands Missile Range, Holloman Air Force Base, Doña Ana Range, and McGregor Range. Alamogordo has strong economic and social links to Holloman Air Force Base. In addition, there is a tangible German influence in the area, as German Air Force personnel live and train in the area. Farming and ranching are perceived to be important social and cultural assets in the county (URS 2005a). Key interests related to BLM-administered land in the county are hunting and OHV use. The Red Sands OHV Area is important to the local community as a recreational opportunity and a location for events that attract participants from outside the area (James Kent Associates 2003).

Doña Ana County is the most urbanized and populous of the three counties. As the area continues to grow, maintaining adequate open space seems to be a very important value, as evidenced by the *ad hoc* committee that developed an open space plan for the region and a recent public opinion survey. BLM-administered land is perceived by local communities in the county in several ways: as an opportunity to provide open space amid the growing population, a way to control the timing and location of development, and a source of land that would be available to accommodate growth if public land is disposed (Citizens' Task Force for Open Space Preservation 2005; Public Opinion Strategies 2006).

Important revenue sources of the Mescalero Apache Nation include timber, hunting, and tourism, underscoring the importance to the tribe of a functioning and scenic regional landscape with recreational opportunities. The Mescalero Apache have raised concerns about opportunities to gather tribal foods on public land and the management of cultural resources (James Kent Associates 2003). The Ysleta del Sur Tribe, based in El Paso, Texas, also has historical interests in the *Planning Area*.

The preservation of natural landscapes is an important value to some residents in the *Planning Area* (BLM 2005b). Local communities appear to have placed a great deal of value in the actions BLM has taken to acquire land in the Organ Mountains and to develop the Dripping Springs Natural Area (James Kent Associates 2003). The interest groups for conservation and recreation issues in BLM's *Decision Area* are larger than the population of the *Planning Area*; recreation users come from around New Mexico and El Paso, Texas, as well as more distant places such as Ciudad Juarez in neighboring Mexico.

Interest groups have emerged to advocate OHV use, and interest in using public land for recreational OHV use seems to be increasing. Retaining access to public land for recreational use has been a theme in public input to the BLM Las Cruces District Office (James Kent Associates 2003; USDOI BLM 2005a). In addition, conflicts are common between advocates for OHV and motorized use and advocates for less intense uses of public land.

Several specific areas within the *Planning Area* were identified during scoping as areas of cultural, symbolic, and traditional significance: Tortugas Mountains (traditional uses and scenic values), Robledo Mountains (Paleozoic Trackways), Petrified Forest (near Truth or Consequences), Otero Mesa, and Three Rivers Petroglyph Site.

3.6 ENVIRONMENTAL JUSTICE

Federal agencies are required to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in accordance with NEPA, Executive Order 12898: *Environmental Justice,* and other applicable laws and regulations. In this section the presence of minority and low-income populations in the *Planning Area* is assessed for each county, the largest metropolitan area within each county, and the Mescalero Apache Nation and are defined as follows:

- Minority populations are persons of Hispanic or Latino origin of any race, African Americans, American Indian/Alaska Natives, and Asians or Pacific Islanders (without double-counting persons of Hispanic/Latino origin who are also identified as part of minority racial groups).
- Low-income populations are persons living below the poverty level. The U.S. Census Bureau uses a set of income thresholds that vary by family size and composition to determine who is poor. Based on this, the poverty level for a family of four in 2002 having two children under the age of 18 was $18,244 (U.S. Census Bureau 2003). U.S. Census Bureau 2000 data, however, is based on 1999 data, when the poverty level for the same family was $16,895.

To determine whether minority and low-income populations occur disproportionately within the larger population, the percentage of minority and low-income residents within each geographic unit is compared against (1) 50 percent of the population in the three-county area, or whether the majority of the population consists of minority or low-income people and (2) the state percentage (Table 3-51).

The majority of New Mexico's population (54 percent) is part of a minority group (Table 3-51). Doña Ana County exceeded the State of New Mexico's minority population proportion; the Mescalero Apache Nation also exceeded the State's percentage of minorities. All the counties in the *Planning Area* exceeded the State of New Mexico's low-income population rate of 18 percent (U.S. Census Bureau 2000). The only geographic area that did not exceed the statewide poverty rate was the City of Alamogordo.

TABLE 3-51
MINORITY AND LOW-INCOME POPULATIONS (2000)[1]

Geographic Area	Percent of Minority Residents	Above 50 Percent	Above 54 Percent	Poverty Rate[2] (Percent)	Poverty Rate Above 50 Percent	Poverty Rate Above 18 Percent
Sierra County	66	Yes	Yes	25	No	Yes
Otero County	28	No	No	21	No	Yes
Doña Ana County	42	Yes	Yes	19	No	Yes
Mescalero Apache Nation	97	Yes	Yes	36	No	Yes
Las Cruces	58	Yes	Yes	23	No	Yes
Truth or Consequences	3	No	No	23	No	Yes
Alamogordo	10	No	No	17	No	No

SOURCE: U.S. Census Bureau 2000
NOTES:
[1]New Mexico comparison population: Minority Population = 54 percent, Low-Income Population = 18 percent
[2] Poverty rate among individuals, based on poverty status in 1999.

Based on minority status, there may be environmental justice populations of concern in Sierra County, Doña Ana County, Mescalero Apache Nation, and the City of Las Cruces. Based on poverty status, there may be environmental justice populations of concern in all geographic areas in the *Planning Area* other than the City of Alamogordo.